

**DEPOT MAINTENANCE WORK REQUIREMENTS
FOR
DEMILITARIZATION
OF**

**CARTRIDGE, 81MM: HE, M821A1
WITH FUZE, MO, M734
CARTRIDGE, 81MM: HE, M889A1
WITH FUZE, PD, M935**



**U.S. ARMY
ARMAMENT MUNITIONS
& CHEMICAL COMMAND**

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HEADQUARTERS, U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND

SEPTEMBER 1994

WARNINGS

DO NOT BURY BLASTING CAPS.

CARTRIDGES OR PROJECTILES WITH FUZE EJECTED FROM DETONATION SITE BY DEMOLITION BLAST WILL BE CONSIDERED ARMED AND WILL NOT BE DISTURBED. THEY WILL BE DETONATED IN PLACE.

ELECTRIC BLASTING CAPS WILL BE CONNECTED TO FIRING CIRCUIT BEFORE TAPING TO DETONATING CORD OR INSERTING INTO DEMOLITION CHARGE.

DO NOT DIRECTLY OBSERVE DISCHARGE OF CONVEYOR. USE MIRROR OR REMOTE CAMERA.

SCRAP METALS MUST BE CERTIFIED BY QUALIFIED PERSONNEL TO BE INERT AND FREE OF EXPLOSIVES PRIOR TO TRANSFER TO DRMO.

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DMWR) HEADQUARTERS
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The reporting of errors, omissions, and recommendations for improving this publication by individual user is encouraged. Your letter or DA Form 2028, Recommended Changes to Publications and Blank Forms, should be mailed directly to Commander, U.S. Army Armament, Research, Development and Engineering Center, ATTN: SMCAR-LSB, Picatinny Arsenal, NJ 07806-5000. A reply will be furnished directly to you.

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CHAPTER 1

INTRODUCTION

1-1. SCOPE

a. This Depot Maintenance Work Requirement (DMWR) contains the minimum requirements for operations depicted by the flowchart, figure 1-1, and specified in chapter 2.

b. Requests for technical changes to procedures or requirements of this DMWR will be referred to Commander, U.S. Army Armament Research, Development and Engineering Center, ATTN: SMCAR-LSA, Picatinny Arsenal, NJ 07806-5000 for ammunition assigned to the Single Manager for Conventional Ammunition (SMCA), with a copy concurrently to AMCCOM, ATTN: AMSMC-DSM, Rock Island, IL 61299-6000.

c. When installations desire to employ alternate safety procedures other than the safety requirements contained in this DMWR, they will obtain approval for the alternate procedures. AMCCOM installations will obtain approval from Commander, AMCCOM, ATTN: AMSMC-SF, Rock Island, IL 61299-6000. DESCOM installations will obtain approval from Commander, DESCOM, ATTN: AMSDS-IN-S, Chambersburg, PA 17201-4170. All other installations will submit requests to their Major Command Safety Offices. All requests will be fully justified, showing equivalent protection provided by procedures outlined in this DMWR. A copy of this request will be submitted to the organizations identified in paragraph 1-lb. Operations predicated on approval of these requests will not be initiated until approval has been granted. Requests for a Waiver or Exemption from requirements of AMC-R 385-100 Safety Manual should be submitted in accordance with paragraph 1-6 of that regulation.

d. For those operations required to accomplish the program Statement of Work, the technical requirements and procedures contained in this document are mandatory and will be incorporated into a local Standing Operating Procedure (SOP). The SOP will be prepared and distributed in accordance with TM 9-1300-250, TM 9-1300-206, and/or AMC-R 700-107, as applicable.

1-2. WORK PLANNING

a. Although each operation in this DMWR is shown as a separate operation module, two or more operations may be combined in the local SOP, if increased efficiency can be obtained and the local facilities are suitable for this and safety is not compromised.

b. Operations should be planned to eliminate accumulations of excess ammunition items. The quantity of ammunition items at an operation location must be the minimum necessary to carry out an efficient operation. Supplies exceeding approximately a 4-hour work requirement will be kept in a service storage building.

c. The SOP will include a provision for removal of line rejects or explosive waste to prevent accumulation of excess ammunition items in the operation building. The quantity of reject explosives or ammunition items stored in or near the operation building will be kept to a minimum.

d. Facilities used to perform the operations specified in chapter 2 will conform to the requirements contained in TM 9-1300-206 and/or AMC-R 385-100.

e. Ammunition and explosives that will be transported between buildings or between bays within a building on conveyors, trucks, skids, racks, trays, etc., will be separated so that a path for propagation of a detonation is precluded. Where rapid response deluge protection is not present over conveyors, items that constitute a mass fire hazard, such as containers of propellant, will be similarly separated to prevent the rapid spreading of fire between bays or buildings. The spacing necessary for this purpose is intraline distance based on the net explosive weight of the items, containers, carts, etc., unless reduced distances have been determined by testing as prescribed in AMC Safety Information Letters and TM 9-1300-206.

f. Ammunition lot and component lot integrity must be maintained. This requirement does not apply to demilitarization unless a special requirement is indicated.

g. All classified components removed will be disposed of in accordance with the appropriate demilitarization code assigned. When demilitarization by detonation or burning of an item containing classified components is required, complete destruction of those classified items will be certified by the appropriate organizational element of the depot activity performing the demilitarization operation.

h. Removal of items containing precious metals will be accomplished prior to the demilitarization operation, if economically feasible.

1-3. DISPOSITION

a. Disposition guidance for serviceable and unserviceable components, assemblies, and materials is included as a part of each operation description.

b. Assemblies, components, or materials considered unfit for further processing or unsuitable for service use will be properly packed in approved containers, marked, and transferred either to storage or to a destruction site for disposal as appropriate.

c. Refer to the following publications for information on packing, marking, and shipping generated assemblies, components, or materials.

- (1) MIL-STD-129: Marking for Shipping and Storage
- (2) TM 9-1300-206: Ammunition and Explosives Standards
- (3) AMC-R 385-100: Safety Manual
- (4) SB 708-4: DOD Consolidated Ammunition Catalog
- (5) No number: Joint Hazard Classification System
- (6) Title 49: Code of Federal Regulations
- (7) ARMS Packaging File

d. All scrap/salvaged materials will be inspected in accordance with SB 742-1, TB 755-1, and DOD 4160.21-M1 certified and verified free from explosives or harmful chemical contamination prior to transfer to the Defense Reutilization and Marketing Office (DRMO) or for reuse/storage.

1.4. EQUIPMENT

a. Equipment cited herein for the various operations has been approved for the operations specified. Activities intending to use other equipment for these operations must obtain approval as specified in paragraph 1-1b.

b. Transfer and materials handling equipment must conform to requirements set forth in TM 9-1300-206 and AMC-R 385-100. Appendix E, Intraplant Transfer Equipment, lists preferred approved Ammunition Peculiar Equipment (APE) for moving and handling ammunition and components during the maintenance operation.

c. Use of Ammunition Peculiar Equipment (APE or nonstandard APE) is governed by AR 700-20 and AMC Supplement 1. All modifications to existing APE and locally fabricated nonstandard APE must have prior approval in accordance with AR 700-20. Locally designed and fabricated equipment, other than APE or nonstandard APE, must be approved by local safety office and the commander of the installation.

d. APE and associated kits must be operated in accordance with the applicable operation and maintenance manual.

1-5. SAFETY REQUIREMENTS

It is the responsibility of each activity to comply with the safety requirements of AMC-R 385-100/TM 9-1300-206, as applicable, along with all local safety requirements. Accidents will be reported in accordance with AR 385-40. Material Safety Data Sheets accompanying hazardous materials should be consulted for applicable precautions and protective equipment.

1-6. PROTECTION AGAINST GENERAL HAZARDS

a. Ammunition and explosives must be handled carefully at all times. Containers must not be tumbled, dragged, thrown, dropped, rolled, walked, or struck against each other.

b. Suitable personal protective clothing, equipment, and devices will be provided to protect against hazards inherent in specific operations, in accordance with TM 9-1300-206/AMC-R 385-100. Sparkproof safety shoes will be provided for all personnel at all operations not requiring conductive safety shoes.

c. When conductive floors, conductive mats, and conductive safety shoes are required in any operation, the conductive reliability of the floors, mats, and safety shoes must be checked using APE 1953, Equipment, Conductive Floor and Conductive Shoe Test or other approved equipment. Usage of APE 1953 must be in accordance with the applicable operator's and maintenance manuals and must conform to local safety requirements.

d. Special precautions are required when handling pentachlorophenol (PENTA)-treated packing materials and pallets. Data on procedural controls, good personal hygiene when handling PENTA, clothing protection, disposition of PENTA-contaminated clothing, and government agency addresses where additional industrial hygiene support may be obtained are contained in appendix F to this DMWR.

e. All requirements in AMC-R 40-2 pertaining to handling of nitroglycerin must be followed.

1-7. PROTECTION AGAINST SPECIFIC HAZARDS

Equipment and materials required for protection against specific hazards are listed in each operation.

1-8. HAZARD ANALYSIS

a. A hazard analysis identifies potential hazards associated with these operations and countermeasures to mitigate these hazards, and assesses the probability and severity of occurrence. Development of this hazard analysis is the responsibility of the installation commander. Each hazard analysis will be approved by the installation safety office and results incorporated into the SOP.

b. To assist these installations in preparation of this site-specific hazard analysis, a preliminary hazard analysis has been added to this DMWR (appendix H).

c. The analysis in appendix H evaluates all identified hazards involved in the DMWR operations, showing probability and severity of occurrence after the countermeasures are applied. A Risk Assessment Code (RAC) Matrix Table is also included in appendix H to help in risk assessment of identified hazards. This information in appendix H is to be used at installations, tailored to specific site requirements, to develop the local hazard analysis with the SOP.

1-9. ENVIRONMENTAL REGULATION COMPLIANCE

a. Operations will be conducted in compliance with current environmental regulations implemented by federal, state, and local governments. The impact of these regulations will not be the same at each installation due to differences in the material being processed, geographic makeup, meteorological conditions, and differences among state/local regulations.

b. Vigilance must be constantly exercised to be aware of changes in current federal, state, and local regulations in order to be in compliance at all times. Exemptions to Environmental Regulations are not allowed for CONUS operations. OCONUS operations will comply with the environmental laws of the country in which the installation is located or the current U.S. environmental law, whichever has a more stringent requirement. See appendix G for additional environmental data.

1-10. RESOURCE CONSERVATION AND RECOVERY REGULATIONS

Pertinent resource conservation and recovery regulations will be followed as contained in the Resource Conservation and Recovery Act (PL 89-272, as amended by PL 91-512, PL 93-611, and PL 94-580).

1-11. RESOURCE RECOVERY

All items of salvageable value will be salvaged as scrap or reusable material. All propellant, explosives, and hazardous materials that can be successfully recovered and reused will be recovered; otherwise, the materials will be disposed of by an environmentally safe and approved method.

1-12. REPORTING REQUIREMENTS

CONUS depot activities will report work accomplishments in accordance with AMC-R 750-28, AR 700-22, or AMC-R 755-8, as applicable.

1-13. REPORTS

DA Form 2415 (Ammunition Condition Report) will be utilized by the depots for reporting of material which the depot may recommend for disposal. This form will be prepared in accordance with DA PAM 738-750.

1-14. CORROSION DATA FEEDBACK

a. Corrosion Prevention Control (CPC) of Army material is a continuing concern. It is important, therefore, that any corrosion problems involving conventional and chemical ammunition be reported, so that the problem can be corrected and improvements made to prevent the problem in future items.

b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials used in ammunition such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may also be a corrosion problem.

c. Such problems should be reported, using the DA Form 2415 (Ammunition Condition Report), to:

Commander
U.S. Army Armament, Munitions and Chemical Command
ATTN: AMSMC-DSM
Rock Island, IL 61299-6000.

Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will assure that the information is identified as a CPC problem.

1-15. DESCRIPTIVE DATA

Descriptive data is shown in appendix D and the applicable technical manuals are listed in appendix A.

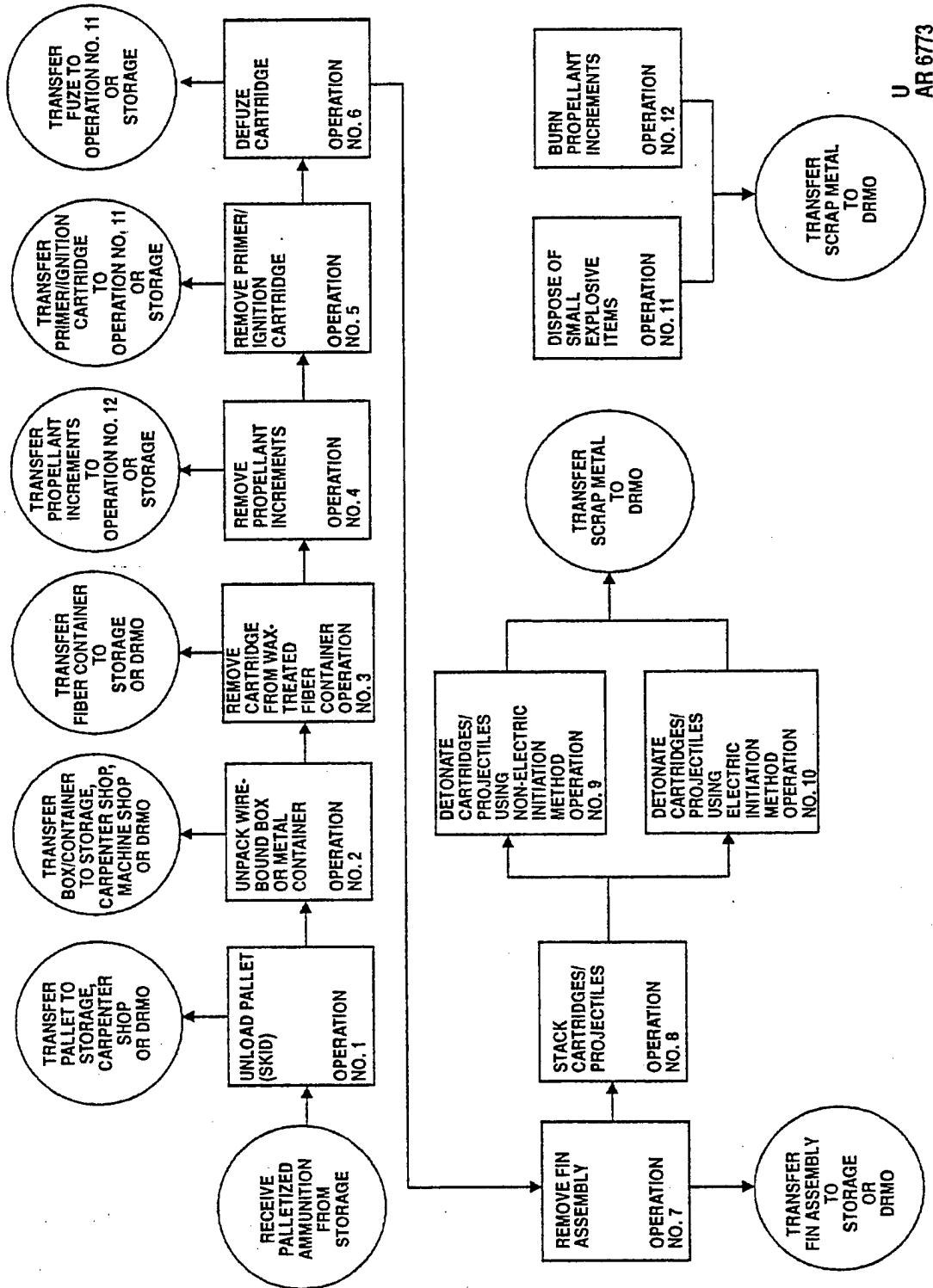
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Figure 1-1. Overall flowchart for demilitarization of cartridge, 81mm: HE, M821A1 with fuze, MO, M734, and HE, M889A1 with fuze, PD, M935.

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CHAPTER 2

DEMILITARIZATION PROCEDURES

2-1. OPERATION NO. 1 - UNLOAD PALLET (SKID)

NOTE

All PENTA-treated pallets, boxes, or other wooden packing materials are marked with the letter "P".

a. Description of Operation.

- (1) Receive palletized ammunition from Storage.
- (2) Identify boxes by nomenclature and lot number.
- (3) Cut strapping with steel strapping cutter and remove strapping.
- (4) Remove wirebound boxes or metal containers from pallet.
- (5) Inspect pallet for serviceability.
- (6) Transfer:
 - (a) Wirebound boxes or metal containers to Operation No. 2.
 - (b) Serviceable pallets to Storage.
 - (c) Unserviceable, repairable pallets to Carpenter Shop.
 - (d) Unserviceable, unrepairable pallets to DRMO.
 - (e) Strapping to DRMO.

b. Special Safety Requirements.

- (1) Personnel exposed in proximity to steel banding or band cutting operations will wear industrial face-

shield and safety glasses or industrial goggles. Operators handling metal banding must wear leather or leather-palmed gloves.

- (2) Personnel handling PENTA-treated wirebound boxes or pallets will wear leather or leather-palmed gloves and explosive handlers (flame-retardant) or tyvek coveralls. Refer to appendix F for additional precautions.

c. Equipment Requirements.

- (1) Coveralls, explosive handlers (flame-retardant) or tyvek.
- (2) Cutter, steel strapping.
- (3) Faceshield, industrial.
- (4) Glasses, safety, or
- (5) Goggles, industrial.
- (6) Gloves, leather or cloth with leather palms.

d. Material Requirements.

None.

e. Special Facilities Requirements.

None.

f. Flowchart.

Figure 2-1 shows the flowchart for Operation No. 1.

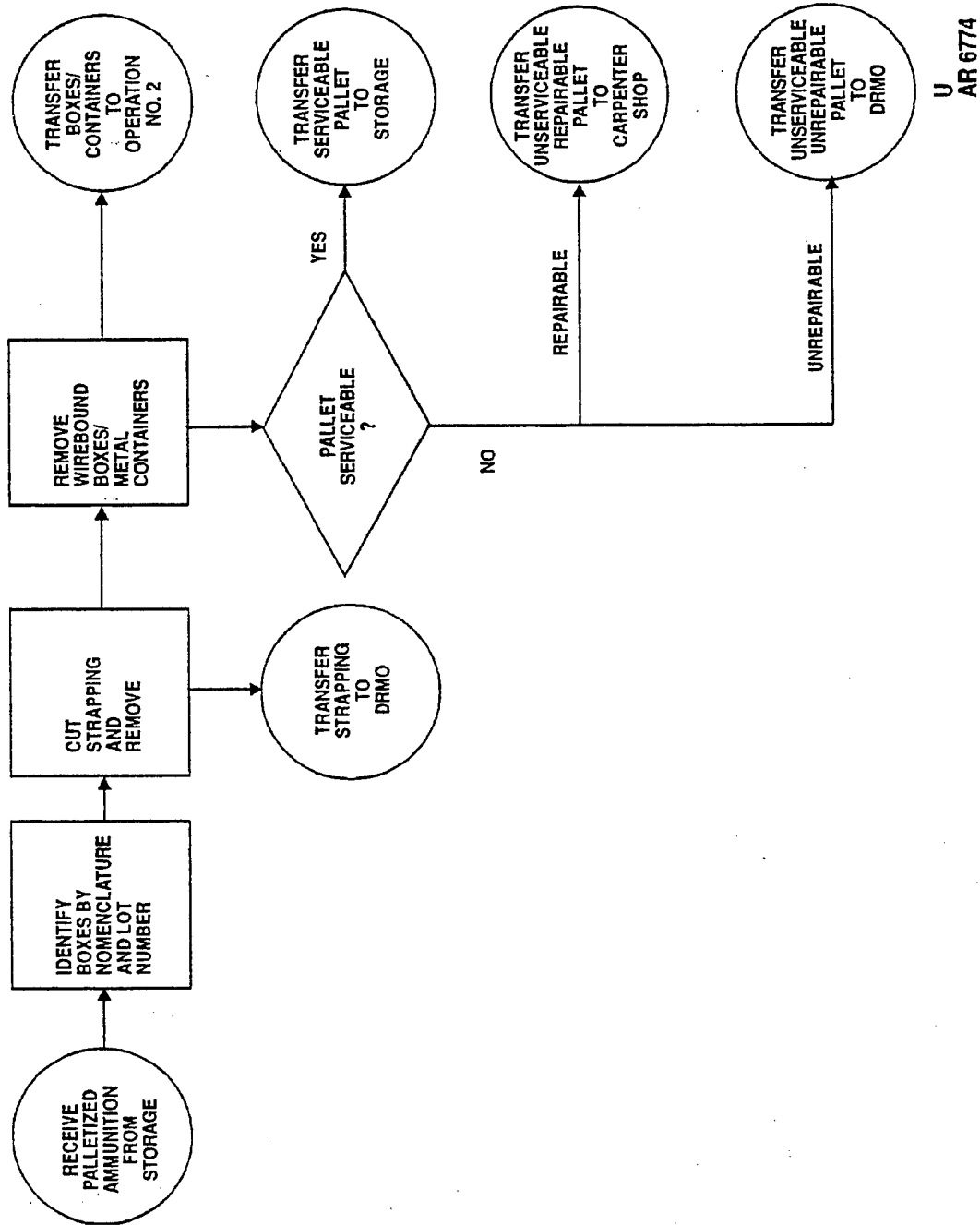


Figure 2-1. Flowchart for Operation No. 1 - Unload pallet (skid).

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2-2. OPERATION NO. 2 - UNPACK WIREBOUND BOX OR METAL CONTAINER**a. Description of Operation.**

- (1) Receive wirebound box ammunition or metal container ammunition from Operation No. 1.
- (2) Cut strapping with steel strapping cutter (wire-bound box) and remove strapping.
- (3) Break metallic seal with pliers or wire cutter and remove.
- (4) Open wirebound box or metal container and remove fiber container.
- (5) Inspect wirebound box or metal container for serviceability in accordance with criteria in TM 9-1300-251-34.
- (6) Transfer:
 - (a) Fiber container to Operation No. 3.
 - (b) Serviceable wirebound box or metal container to Storage.
 - (c) Unserviceable, repairable wirebound box to Carpenter Shop.
 - (d) Unserviceable, unrepairable wirebound box to DRMO.
 - (e) Unserviceable, repairable metal container to Machine Shop.
 - (f) Unserviceable, unrepairable metal container to DRMO.
 - (g) Strapping and seal to DRMO.

b. Special Safety Requirements.

- (1) Personnel exposed in proximity to steel banding or band cutting operations will wear industrial face-shield and safety glasses or industrial goggles. Operators handling metal banding will also wear leather or leather-palmed gloves.

- (2) Personnel handling PENTA-treated wirebound boxes will wear leather or leather-palmed work gloves and explosive handlers (flame-retardant) or tyvek coveralls. Refer to appendix F for additional precautions.

c. Equipment Requirements.

- (1) Coveralls, explosive handlers (flame-retardant) or tyvek.
- (2) Cutter, steel strapping.
- (3) Faceshield, industrial.
- (4) Glasses, safety, or
- (5) Goggles, industrial.
- (6) Gloves, leather or cloth with leather palms.
- (7) Pliers, diagonal cutting.

d. Material Requirements.

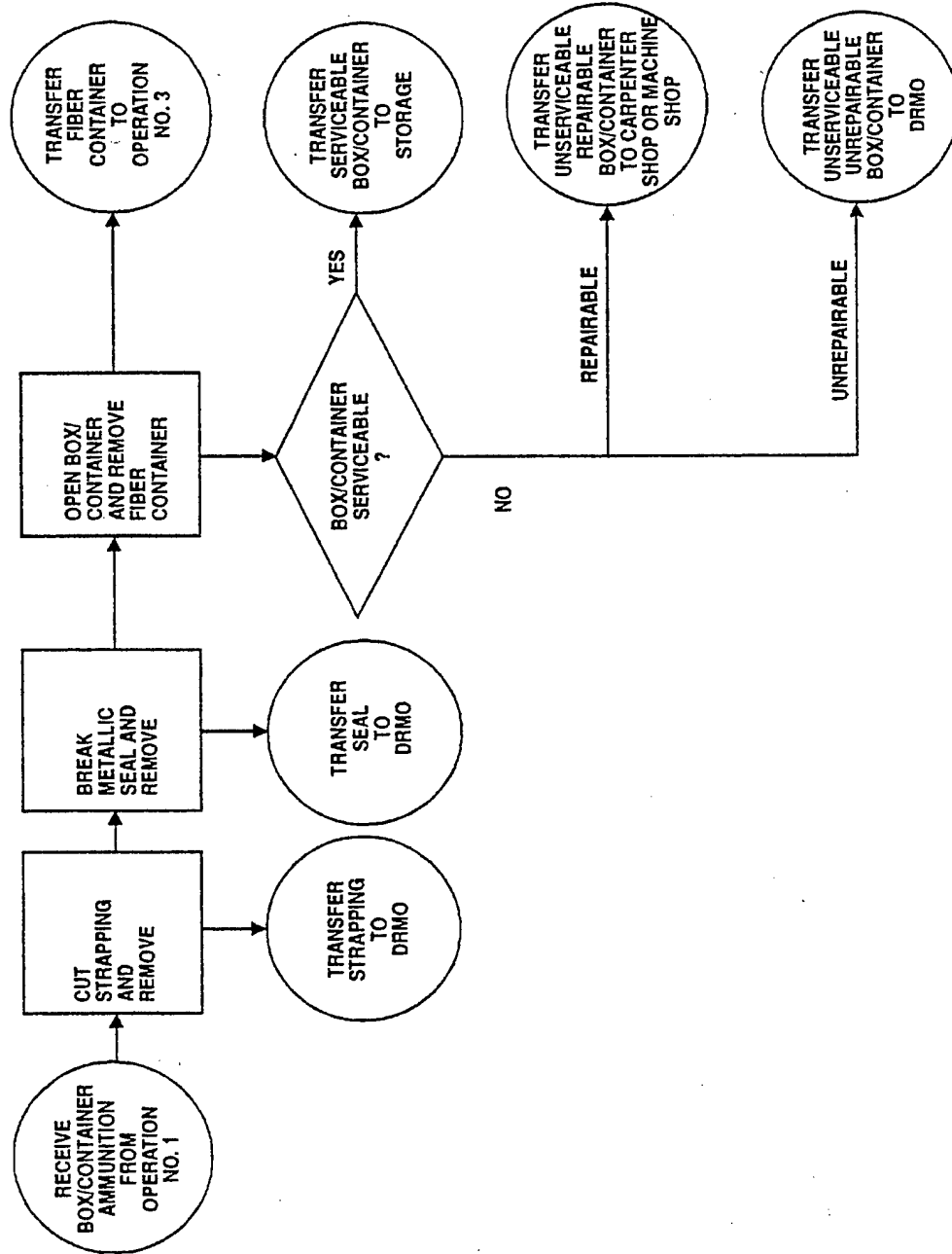
None.

e. Special Facilities Requirements.

None.

f. Flowchart.

Figure 2-2 shows the flowchart for Operation No. 2.



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Figure 2-2. Flowchart for Operation No. 2 - Unpack wirebound box or metal container.

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2-3. OPERATION NO. 3 - REMOVE CARTRIDGE FROM WAX-TREATED FIBER CONTAINER

a. Description of Operation.

- (1) Receive:
 - (a) Fiber container from Operation No. 2.
 - (b) Primer protector (metal aluminum disc) from Machine Shop.
- (2) Remove tear strip from fiber container by hand or by placing container in tear strip remover machine.
- (3) Place fiber container in pneumatic lid remover or automatic lid removal machine to remove fiber container lid, or remove lid by hand.
- (4) Activate machine to remove lid.
- (5) Remove lid and fiber container from machine.
- (6) Grasp fins and remove cartridge from fiber container.

NOTE

Protect primer with primer protector (metal "lead" disc) or other suitable cover during handling and transfer operations. Refer to TM 9-1300-206 or AMC-R 385-100.

- (7) Remove leaking propellant increments from cartridge and placed in water-filled container.
- (8) Place primer protector (metal aluminum disc) over primer and tape securely in place or use other suitable cover.

(9) Transfer:

- (a) Cartridge to Operation No. 4.
- (b) Serviceable fiber container and fiber container fillers to Storage.
- (c) Unserviceable fiber container and fiber container fillers to DRMO.
- (d) Leaking propellant increments in water-filled container to Operation No. 12.

b. Special Safety Requirements.

- (1) Protector disc must be in place on primer end of fin assembly during handling and transportation.
- (2) Operators will wear explosive handlers (flame-retardant) coveralls with head covering, conductive safety shoes, and safety glasses or industrial goggles.
- (3) Conductive floor covering or mats will be provided at operation location in accordance with provisions of AMC-R 385-100 or TM 9-1300-206.
- (4) Equipment and workbenches will be electrically grounded and properly cross-bonded.
- (5) Leaking propellant increments will be collected in water-filled containers.

c. Equipment Requirements.

- (1) Container, water-filled.
- (2) Coveralls, explosive handlers (flame-retardant), with head covering.
- (3) Glasses, safety, or
- (4) Goggles, industrial.
- (5) Machine, automatic lid removal, APE 1270 with kit E002 or APE 1270M1 with kit E002.

(6) Remover, lid, pneumatic, APE 1003 or 1003M1, with kit E002.

(7) Remover, tear strip, APE 1295.

(8) Shoes, safety, conductive.

d. Material Requirements.

(1) Disc, protector, metal aluminum, 1-1/4 inch diameter x 1/8-inch thick, locally fabricated.

(2) Tape, pressure sensitive, adhesive, 1-inch.

e. Special Facilities Requirements.

Conductive flooring or conductive mats.

f. Flowchart.

Figure 2-3 shows the flowchart for Operation No. 3.

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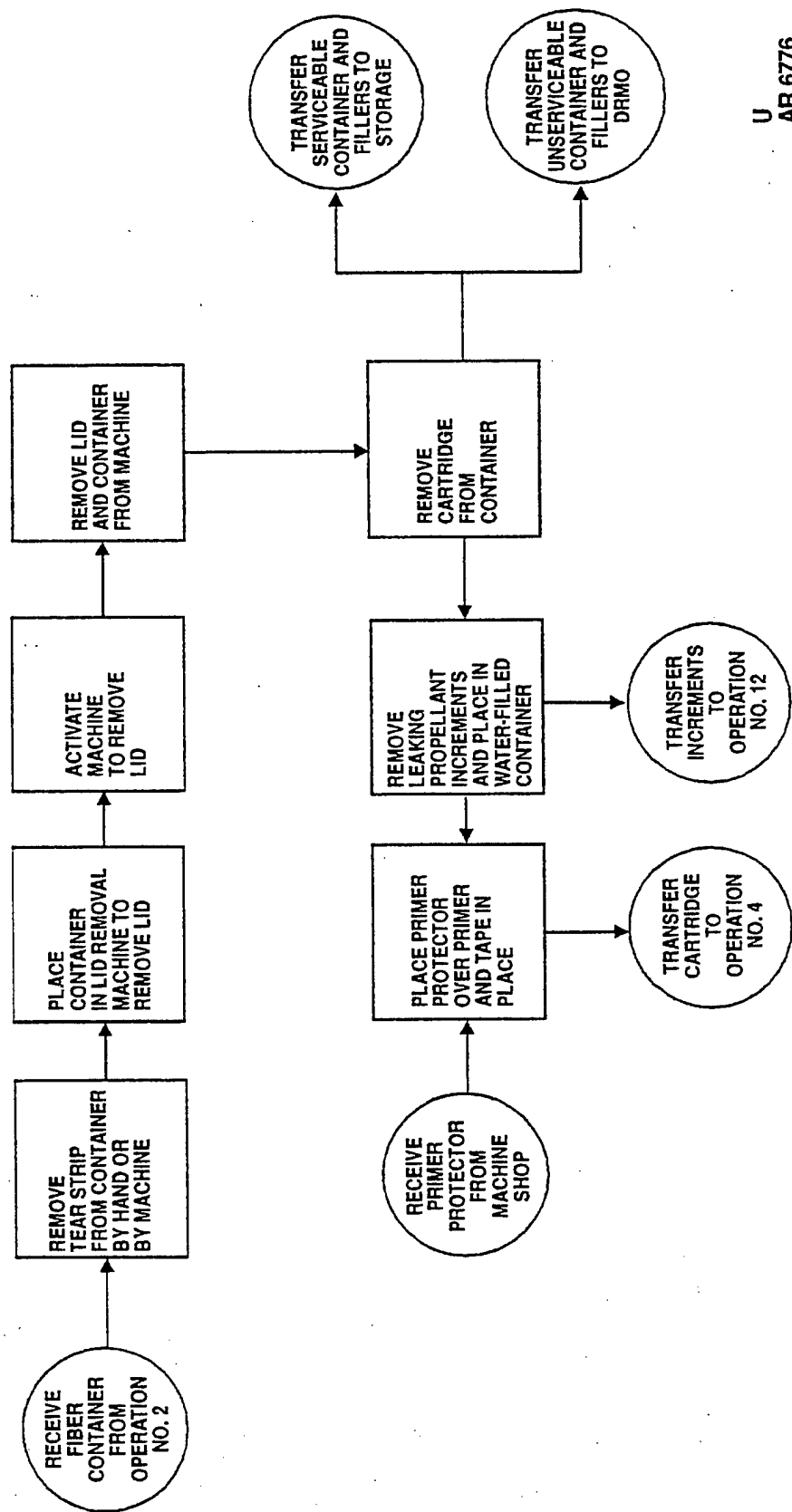
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Figure 2-3. Flowchart for Operation No. 3 - Remove cartridge from wax-treated fiber container.

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2-4. OPERATION NO. 4 - REMOVE PROPELLANT INCREMENTS

a. Description of Operation.

- (1) Receive cartridge from Operation No. 3.
- (2) Remove propellant increments from fin assembly. Identify and maintain lot integrity.
- (3) Inspect propellant increments.
- (4) If charge is to be reused, pack propellant increments in approved container and mark accordingly.
- (5) Leaking propellant increments shall be placed in water-filled container.
- (6) Transfer:
 - (a) Cartridge to Operation No. 5.

NOTE

Disposition instructions for destruction or reuse/recycle of all propellant generated from download demilitarization, which is not scheduled for immediate destruction, shall be sought prior to start of demilitarization operations from Commander, AMCCOM, ATTN: AMSMC-QAS. (Correspondence will include lot number, NSN, ownership, condition code, and planned disposition, if known.) Recovered propellant for which destruction is not scheduled to be completed within 60 days requires a chemical stability test at time each lot is generated. AMSMC-QAS will provide instruction for sampling and shipment of samples for chemical stability test. If destruction of propellant is determined, it will be done in accordance with this DMWR or DMWR 9-1300-0000-X4.

- (b) Serviceable propellant increments to Operation No. 12 or Storage.
- (c) Unserviceable propellant increments to Operation No. 12.
- (d) Leaking propellant increments to Operation No. 12.

b. Special Safety Requirements.

- (1) Conductive flooring or conductive mats will be provided at operation locations.
- (2) All operators will wear conductive safety shoes, explosive handlers (flame-retardant) coveralls with head covering, and safety glasses or industrial goggles. Personnel handling propellant charges will wear cotton gloves.
- (3) Protector disc or other suitable cover must be in place on primer end of fin assembly during handling and transportation.
- (4) Work area will be protected with deluge system with rapid response detection device complying with provisions of AMC-R 385-100 or TM 9-1300-206.
- (5) All equipment will be electrically grounded and properly cross-bonded. Grounding system will be in accordance with DA Pam 385-64.
- (6) Torn bags and loose propellant will be collected in water-filled container.

c. Equipment Requirements.

- (1) Container, propellant storage, stainless steel lined, approved.
- (2) Container, water-filled.
- (3) Coveralls, explosive handlers (flame-retardant), with head covering.
- (4) Glasses, safety, or
- (5) Goggles, industrial.

(6) Gloves, cotton.

(7) Shoes, safety, conductive.

(8) Tester, conductive mat shoe, APE 1953

d. Material Requirements.

None.

e. Special Facilities Requirements.

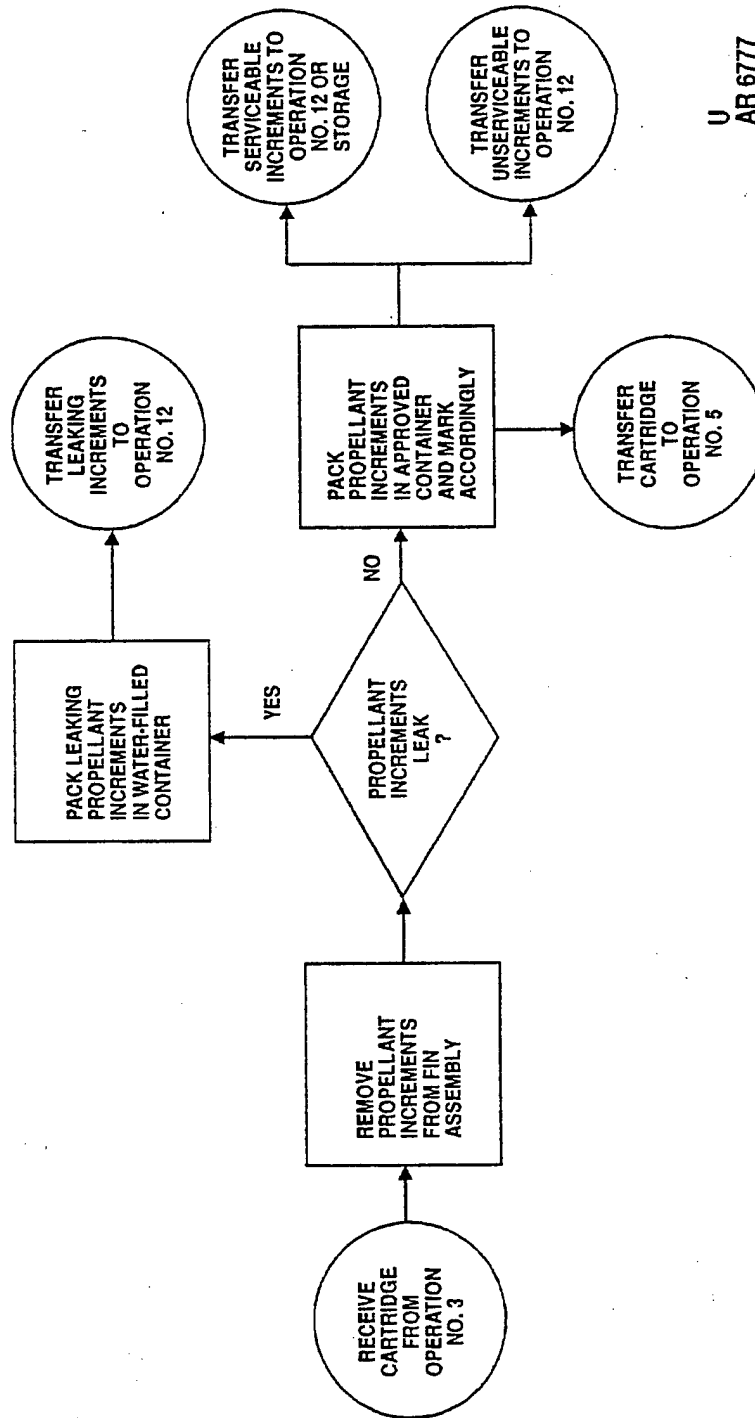
(1) Conductive flooring or conductive mats.

(2) Deluge system with rapid response detection device.

f. Flowchart.

Figure 2-4 shows the flowchart for Operation No. 4.

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Figure 2-4. Flowchart for Operation No. 4 - Remove propellant increments.

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2-5. OPERATION NO. 5 - REMOVE PRIMER/IGNITION CARTRIDGE**a. Description of Operation.**

- (1) Receive cartridge from Operation No. 4.
- (2) Remove primer protector disc from end of fin assembly.
- (3) Secure cartridge in primer removal machine.
- (4) Engage pins in primer head (wrench slots). Unscrew primer/ignition cartridge in counterclockwise direction until it is loose.
- (5) Remove cartridge from primer removal machine.
- (6) Complete removal of primer/ignition cartridge from fin assembly by hand.
- (7) Place primer/ignition cartridge in locally approved containers.

NOTE

Identify and maintain lot integrity on all items that are to be reused.

(8) Transfer:

- (a) Cartridge to Operation No. 6.
- (b) Primer/ignition cartridge to Operation No. 11 or Storage.
- (c) Primer protector disc to Storage or DRMO.

b. Special Safety Requirements.

- (1) Protect primer with suitable cover or metal aluminum disc during transfer operation.

- (2) Operators will wear explosive handlers (flame-retardant) coveralls and safety glasses or industrial goggles.
- (3) All equipment and workbenches will be electrically grounded and properly cross-bonded.
- (4) Do not hold cartridge over flash holes.

c. Equipment Requirements.

- (1) Container, primer/ignition cartridge, approved.
- (2) Coveralls, explosive handlers (flame-retardant) or tyvek.
- (3) Fixture, removal and insertion, primer, APE 1148.
- (4) Glasses, safety, or
- (5) Goggles, industrial.
- (6) Machine, vertical disassembly, APE 1153 or 1153M1, with kit E029.
- (7) Shoes, safety, conductive.

d. Material Requirements.

None.

e. Special Facilities Requirements.

None.

f. Flowchart.

Figure 2-5 shows the flowchart for Operation No. 5.

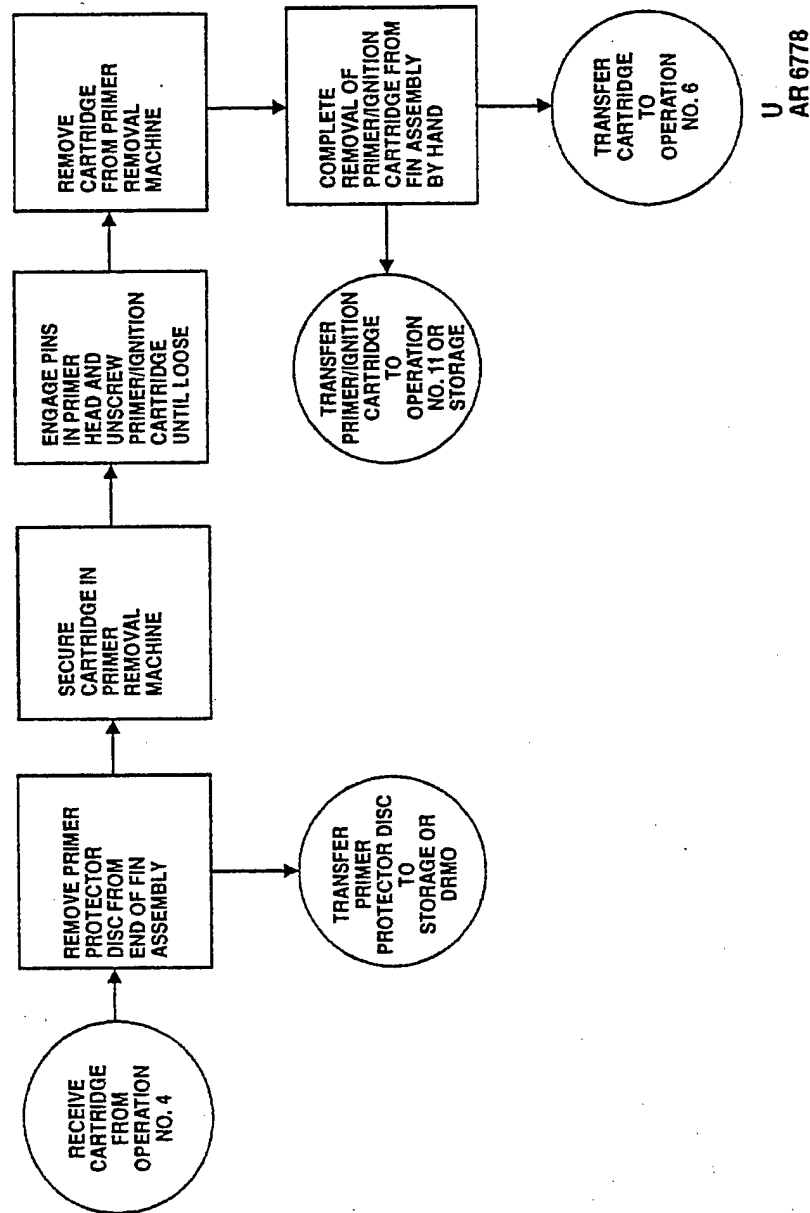


Figure 2-5. Flowchart for Operation No. 5 - Remove primer/ignition cartridge.

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2-6. OPERATION NO. 6 - DEFUZE CARTRIDGE**a. Description of Operation.**

- (1) Receive cartridge from Operation No. 5.
- (2a) Place cartridge in pneumatic vise. Rotate fuze counterclockwise to remove fuze using 1-3/4 inch open end fuze wrench (for M821A1 Cartridge with M734 Fuze) or using fuze adapter (locally fabricated) with ratchet wrench or torque wrench (for M889A1 Cartridge with M935 Fuze) or
- (2b) Position cartridge in vertical disassembly machine and activate machine to remove fuze from cartridge.
- (3) Pack fuze in locally approved container.

NOTE

- Identify and maintain lot integrity on all items that are to be reused.
 - If fuze cannot be removed, transfer cartridge to Operation No. 7.
- (4) Assemble temporary closing plug to projectile hand-tight.
 - (5) Determine if fuze can be removed from cartridge.
 - (6) Remove cartridge from vise.
 - (7) Transfer:
 - (a) Cartridge or cartridge with fuze to Operation No. 7.
 - (b) Serviceable fuze to Operation No. 11 or Storage.
 - (c) Unserviceable fuze to Operation No. 11.

b. Special Safety Requirements.

- (1) Operators will wear explosive handlers (flame-retardant) coveralls.
- (2) Disassembly operations and equipment must comply with applicable provisions of AMC-R 385-100 or TM 9-1300-206.

c. Equipment Requirements.

- (1) Container, fuze, approved.
- (2) Coveralls, explosive handlers (flame-retardant).
- (3) Machine, two spindle, defuzing, APE 1002, 1002M1 or 1002M2, with kit E016.
- (4) Machine, vertical disassembly, APE 1153 or 1153M1, with kit E029.
- (5) Wrench, fuze, 1-3/4 open end.
- (6) Wrench, fuze adapter, locally fabricated (figure 2-6a).
- (7) Wrench, fuze, pneumatic, APE 1247 with kit TBD.
- (8) Vise, pneumatic, ammunition with safety shield, APE 1065 with kit E013, APE 1204 with kit E014, or APE 1204M1 with kit E014.

d. Material Requirements.

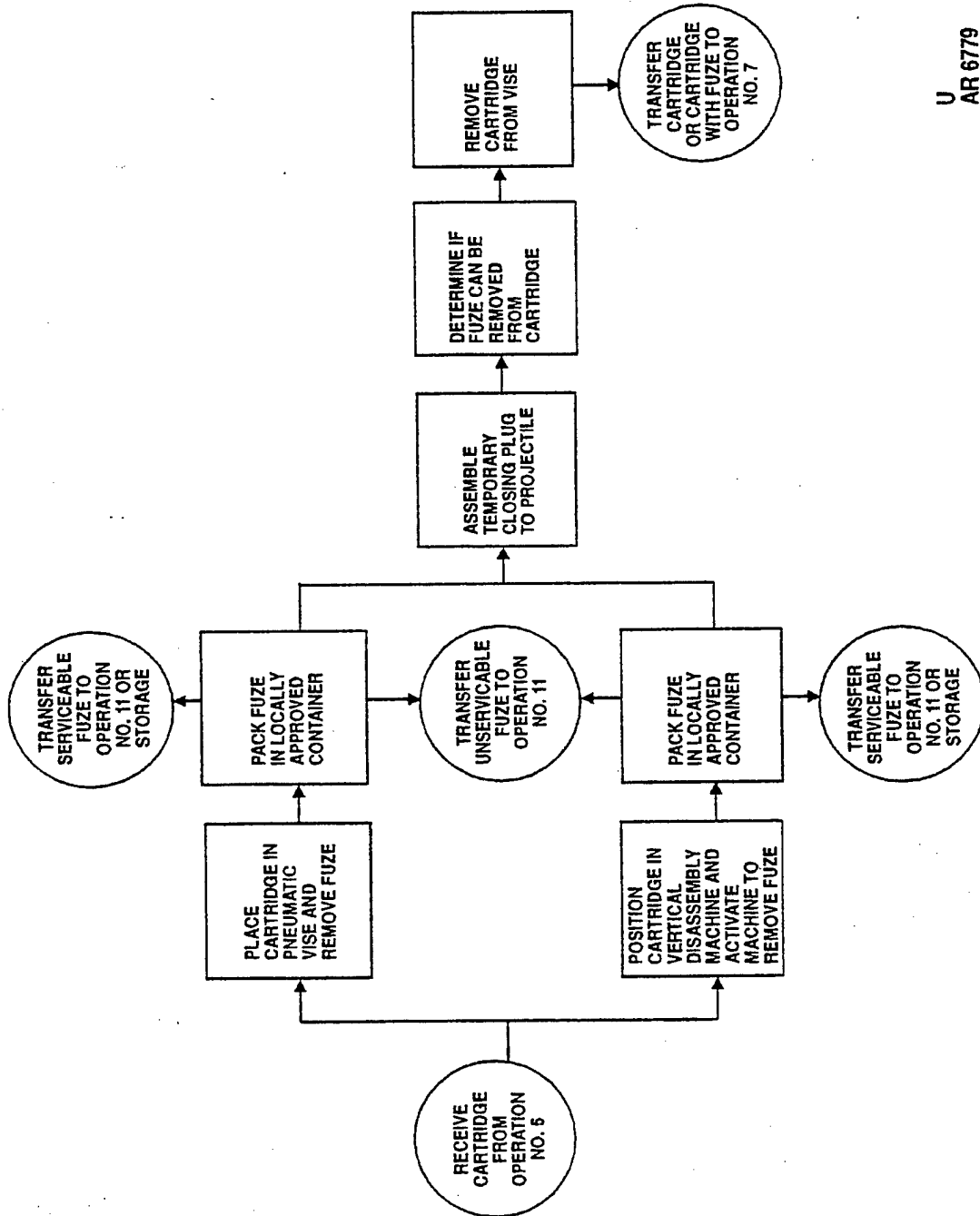
Nose plug, projectile.

e. Special Facilities Requirements.

None.

f. Flowchart.

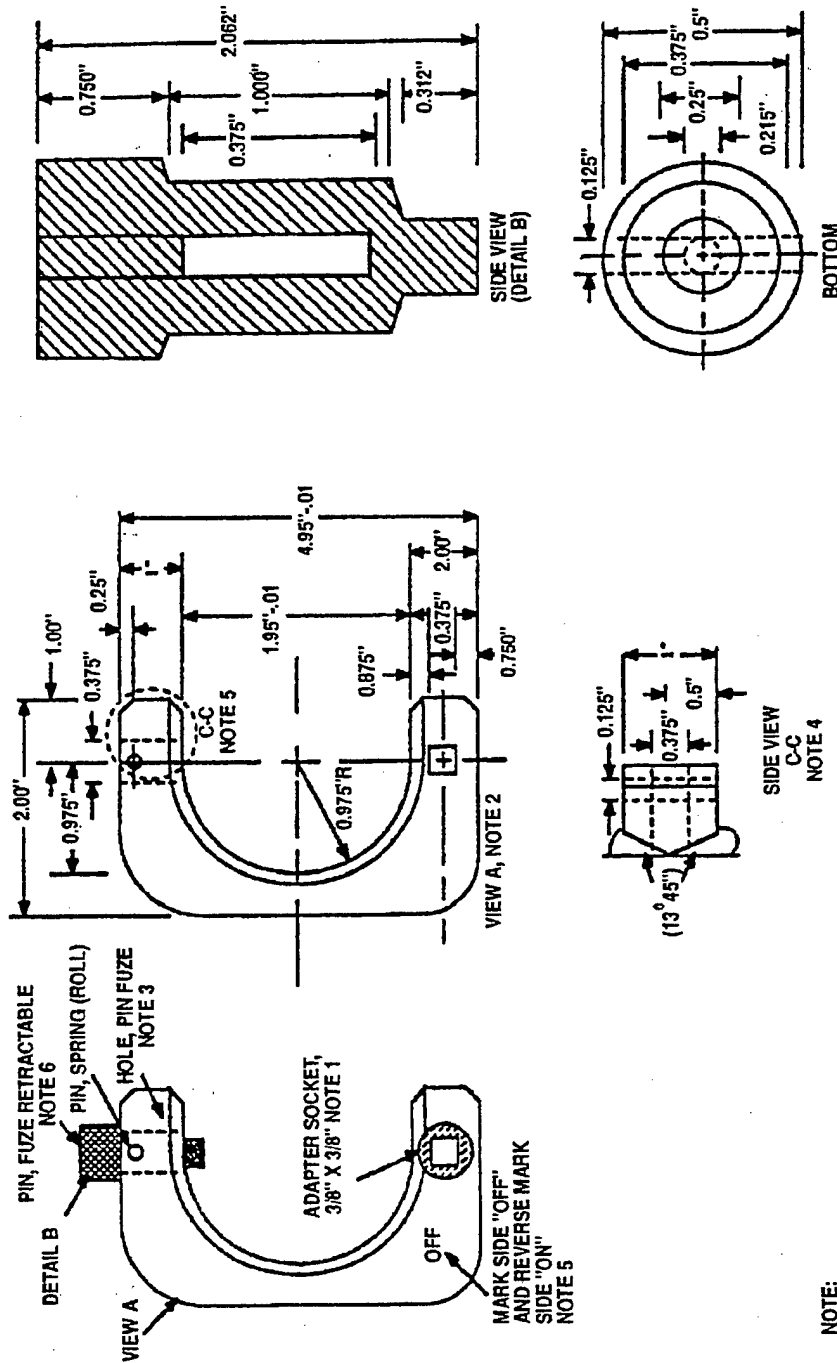
Figure 2-6 shows the flowchart for Operation No. 6.



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Figure 2-6. Flowchart for Operation No. 6 - Defuze cartridge.

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NOTE:

1. USE STEEL 3/8" DRIVE 3/8" SOCKET ADAPTER AND WELD ON TO THE PLATE (THE FUZE DISASSEMBLY TORQUE IS A MAXIMUM OF 580 IN.-LBS).
2. STEEL PLATE 1.00" THICK, 4.95" \pm .01 LONG, 2.00" WIDE.
3. DRILL 0.375" HOLE THROUGH THE PLATE.
4. THE PLATE IS CUT AT A 13 DEGREE 45' ANGLE AS SHOWN.
5. TO DISASSEMBLE FUZE, USE WRENCH MARKED "OFF" TOWARD THE FUZE NOSE, AND TO ASSEMBLE FUZE, REVERSE WRENCH SO SIDE MARKED "ON" IS TOWARD THE FUZE NOSE.
6. LOAD SPRING (1" L X 1/8" O.D.) INSIDE THE RETRACTABLE FUZE PIN PRIOR TO ASSEMBLING TO THE PLATE WITH THE SPRING PIN.

Figure 2-6a. Torque wrench adaptor for fuze, PD, M935.

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2-7. OPERATION NO. 7 - REMOVE FIN ASSEMBLY**a. Description of Operation.**

- (1) Receive cartridge from Operation No. 6.
- (2a) Place cartridge in pneumatic vise and loosen fin assembly with fin disassembly wrench or
- (2b) Secure cartridge in fin removal device and activate machine to remove fin (turn fin in counterclockwise direction until it is loose).

NOTE

- Do not use strap wrench to remove fin assembly.
- If fin assembly cannot be removed, transfer cartridge to Operation No. 8.

- (3) Complete removal of fin assembly from projectile by hand.
- (4) Determine if fin assembly can be removed from cartridge.
- (5) Remove projectile from removal device or pneumatic vise.
- (6) Transfer:
 - (a) Projectile to Operation No. 8.
 - (b) Projectile with fin assembly to Operation No. 8.
 - (c) Fin assembly to Storage or DRMO.

b. Special Safety Requirements.

Care must be taken to preclude damage and/or distortion of fin assembly.

c. Equipment Requirements.

- (1) Machine, vertical disassembly, APE 1153 or 1153M1, with kit E029.
- (2) Vise, pneumatic, ammunition with safety shield, APE 1065 with kit E013, APE 1204 with kit E014, or APE 1204M1 with kit E014.
- (3) Wrench, 81mm mortar fin disassembly, APE 2128M1.

d. Material Requirements.

None.

e. Special Facilities Requirements.

None.

f. Flowchart.

Figure 2-7 shows the flowchart for Operation No. 7.

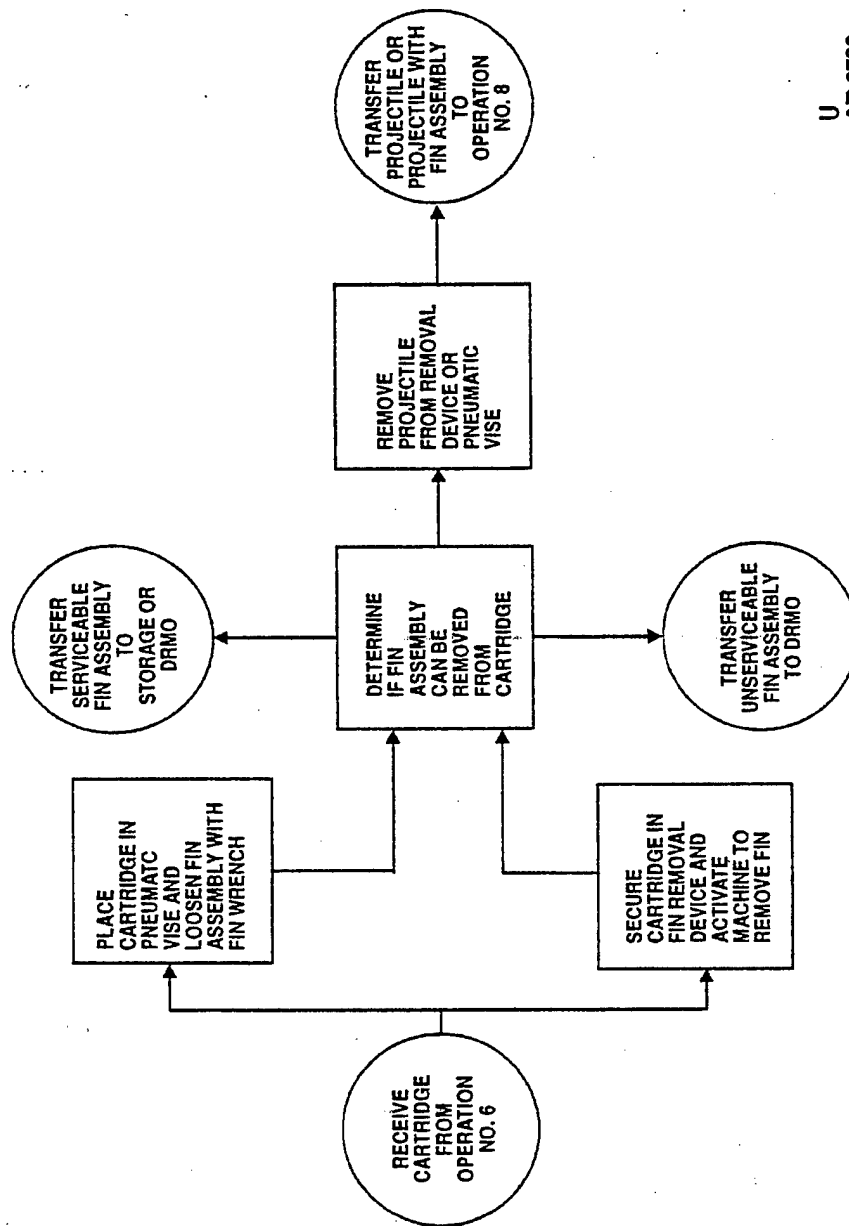
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Figure 2-7. Flowchart for Operation No. 7 - Remove fin assembly.

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2-8. OPERATION NO. 8 - STACK CARTRIDGES/PROJECTILES

a. Description of Operation.NOTE

- When space permits and demolition area is located in remote area, detonation may be accomplished without aid of pit or trench.
- A minimum distance of 2,400 feet from all magazines, inhabited buildings, public traffic routes, and operating buildings will be observed for any destruction area, unless pits or similar aids are used to limit range of fragments and debris, and trials prove that lesser limits may be used.

- (1) Receive projectile from Operation No. 7.

NOTE

The quantity of explosive items that may be destroyed at one time will depend on local conditions and restrictions. Range officer will determine quantity to be done.

- (2) Prepare trench.
- (3) Drive four batter boards at designated head of stack point (see figure 2-8a) using sledge hammer.

NOTE

Each stack set of cartridges or projectiles for detonation will consist of two stacks (side-by-side in close contact). Sixty-seven cartridges will comprise one-half stack (34 cartridges or projectiles in bottom layer and 33 in top layer). Stack set may contain maximum of 134 cartridges.

- (4) Stack bottom row of cartridges or projectiles as per figure 2-8a, placing them nose-to-nose or base-to-base.
- (5) Mark locations for four batter boards at tail end of stack. Remove cartridges or projectiles from area.
- (6) Using sledge hammer, drive four batter boards in place to keep cartridges or projectiles from rolling. Replace cartridges or projectiles in stack.
- (7) Stack other row of cartridges or projectiles per figure 2-8a (as required) until desired quantity is reached.
- (8) Proceed to Operation No. 9 or 10.

b. Special Safety Requirements.

Maintain quantity-distance requirements for 1.1E Ammunition in accordance with AMC-R 385-100 and TM 9-1300-206.

c. Equipment Requirements.

- (1) Forklift, gas-operated, for explosive handling.
- (2) Gloves, leather or cloth with leather palms.
- (3) Hammer, sledge.
- (4) Shoes, steel-toed.

d. Material Requirements.

Stakes, wood (batter boards), 1 x 3 x 24 inches, pin,
preformed.

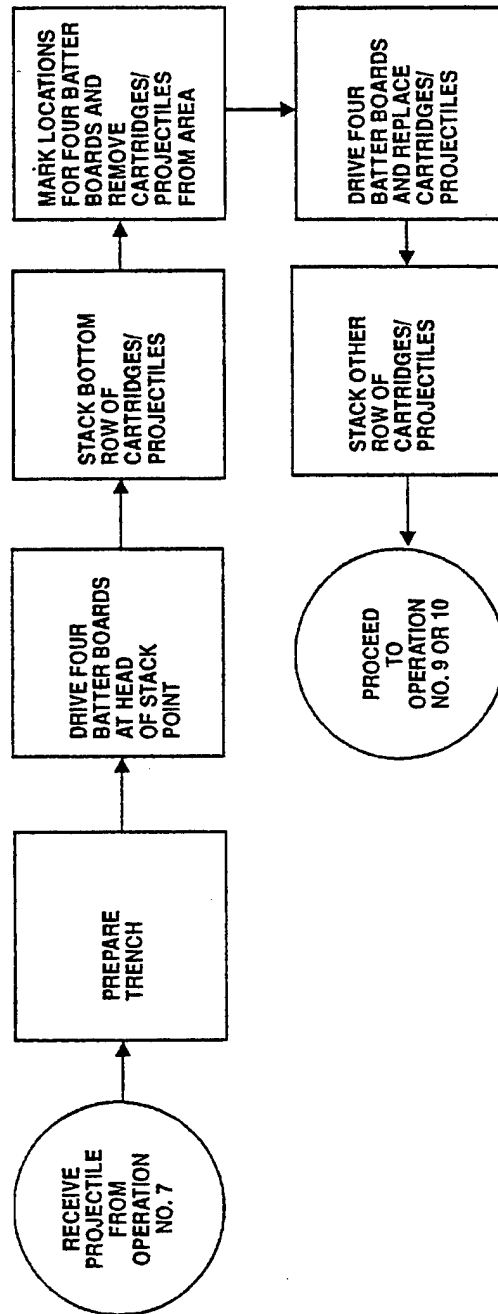
e. Special Facilities Requirements.

None.

f. Flowchart.

Figure 2-8 shows the flowchart for Operation No. 8.

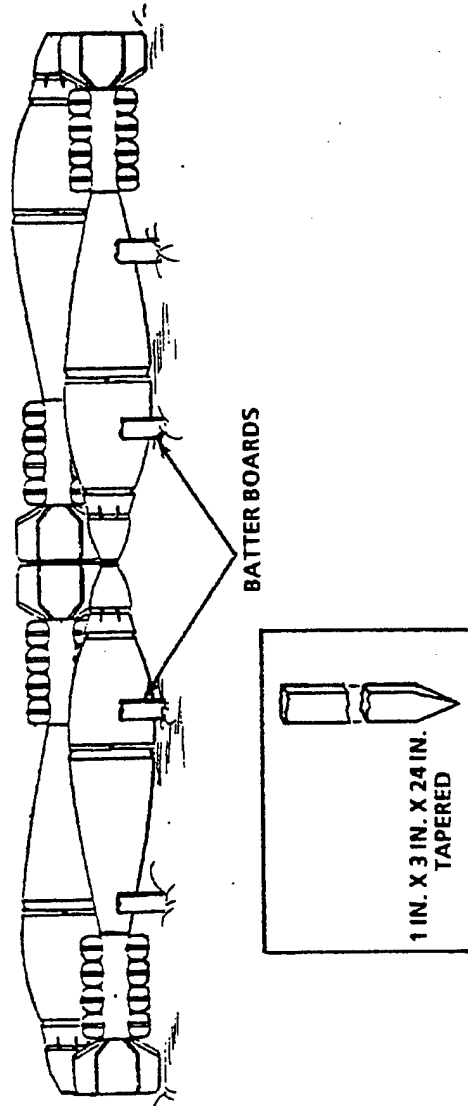
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Figure 2-8. Flowchart for Operation No. 8 - Stack cartridges/projectiles.

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Figure 2-8a. Basic layout for stacking cartridges.

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2-9. OPERATION NO. 9 - DETONATE CARTRIDGES/PROJECTILES USING
NONELECTRIC INITIATION METHOD

a. Description of Operation.

NOTE

The quantity of cartridges or projectiles that may be destroyed at one time is subject to explosive limits of demolition ground.

- (1) Receive stacked cartridges or projectiles from Operation No. 8.
- (2) Open box of flaked or granulated TNT or Composition B and pour it over stack of cartridges or projectiles until stack is covered to depth of two inches minimum per figure 2-9a.

WARNING

DO NOT BURY BLASTING CAPS.

NOTE

If above-ground detonation is allowed, steps (3) and (4) may be omitted. Range officer is responsible for assuring that all restrictions are observed.

- (3) Prime 1/2-pound TNT blocks with detonating cord as instructed in FM 5-25 or TM 9-1375-213-12 and place on stack of cartridges or projectiles at predetermined points (one block per every ten cartridges or projectiles) per figure 2-9a, leaving sufficient

detonating cord running into and out of stack to reach above ground, after burial, to allow easy connection to nonelectric blasting caps.

- (4) Place sheets of corrugated fiberboard or plastic over cartridges or projectiles.
- (5) Fill entire trench or pit with earth to ensure complete coverage of cartridges or projectiles with required depth of earth (minimum two feet).
- (6) Form separate detonating cord ring main around cartridges or projectiles. Tie in free ends of detonating cord from each charge to ring main.
- (7) Test burning rate of time blasting fuse in accordance with FM 5-25 or TM 9-1375-213-12. Time blasting fuse will be at least three feet in length and will have minimum burning time of 120 seconds.
- (8) Cut length of time blasting fuse with sufficient burning time for each nonelectric blasting cap to allow personnel to reach shelter or safe observation position. Inspect each end of fuse to assure insulation is not obstructing fuse core. Tape or crimp nonelectric blasting caps to one end of each time blasting fuse.
- (9) Attach time blasting fuse igniter to each free end of time fuse.
- (10) Tape two nonelectric blasting caps with time blasting fuse and fuse igniters to leads of ring main.
- (11) Warn guard at entrance to area. Ensure that danger area is clear of exposed personnel.
- (12) Fire igniter and retreat to shelter.
- (13) Observe and listen for high-order detonation.

WARNING

CARTRIDGES OR PROJECTILES WITH FUZE EJECTED FROM DETONATION SITE BY DEMOLITION BLAST WILL BE CONSIDERED ARMED AND WILL NOT BE DISTURBED. THEY WILL BE DETONATED IN PLACE.

- (14) After detonation, search area for unexploded cartridges or projectiles.
- (15) Detonate any unexploded cartridges or projectiles in place by placing 1/2-pound block of TNT or equivalent beside each cartridge or projectile and detonating remotely (figure 2-9b).
- (16) Transfer scrap metal to DRMO.

b. Special Safety Requirements.

- (1) Ensure all precautions are taken during nonelectric initiation method to comply with all applicable safety provisions as indicated in AMC-R 385-100, FM 2-25, TM 9-1300-206, TM 9-1300-213-12, and TM 9-1300-277.
- (2) Safety glasses or industrial goggles must be worn while handling blasting caps.
- (3) In case of misfires, personnel will not return to point of detonation for at least 30 minutes, after which not more than two qualified personnel will be permitted to examine misfire. Investigation and correction should be undertaken by person who placed charges.
- (4) Operators inspecting detonation site will wear flack vest with groin protector, flack helmet, explosive handlers (flame-retardant) coveralls and safety glasses or industrial goggles.
- (5) During detonation operations, the number of people in area exposed to hazard will be kept to minimum. Warning signs or road blocks will be posted to restricted area and to ensure proper segregation of activities. The number of personnel engaged in

detonation operations will be no fewer than two, and operations will be arranged so that not all personnel will be exposed to an incident.

- (6) All salvaged material will be inspected for and certified free from explosive or harmful contamination prior to transfer to DRMO for sale in accordance with DOD 4160.21-M-1, or for reuse or storage.
- (7) Cartridges or projectiles ejected from detonation site by demolition blast will be considered armed and will not be disturbed while placing TNT or M112 demolition charges adjacent to or above cartridges or projectiles.

c. Equipment Requirements.

- (1) Armor, body, fragmentation and small arms protection, ground troops and parachutists, front and back torso.
- (2) Armor, body, fragmentation protection for groin.
- (3) Coveralls, explosive handlers (flame-retardant) or tyvek.
- (4) Crimper, blasting cap, M2, with fuse cutter.
- (5) Faceshield, industrial.
- (6) Glasses, safety, or
- (7) Goggles, industrial.
- (8) Helmet, ground troops, steel, olive green, quick-release chin strap, or helmet, parachutists, steel, fragmentation protection, universal size.

d. Material Requirements.

- (1) Cap, blasting, nonelectric, M7 (T7).
- (2) Cap, blasting, special, nonelectric, J1 (PETN), type I.
- (3) Charge, demolition, block, Composition C-4, 1-1/4 pound, M112.

- (4) Charge, demolition, block, TNT, 1/2-pound.
- (5) Cord, detonating, reinforced pliofilm wrapped, waterproof, type 2, class L.
- (6) Firing device, demolition, or
- (7) Fuse, blasting, time, M700 (safety fuse).
- (8) Igniter, time blasting fuse, M2 or M60.
- (9) Tape, insulation, electrical, black adhesive cotton, 3/4-inch x 85-feet, or tape, pressure-sensitive, adhesive.
- (10) TNT, flake or granulated.

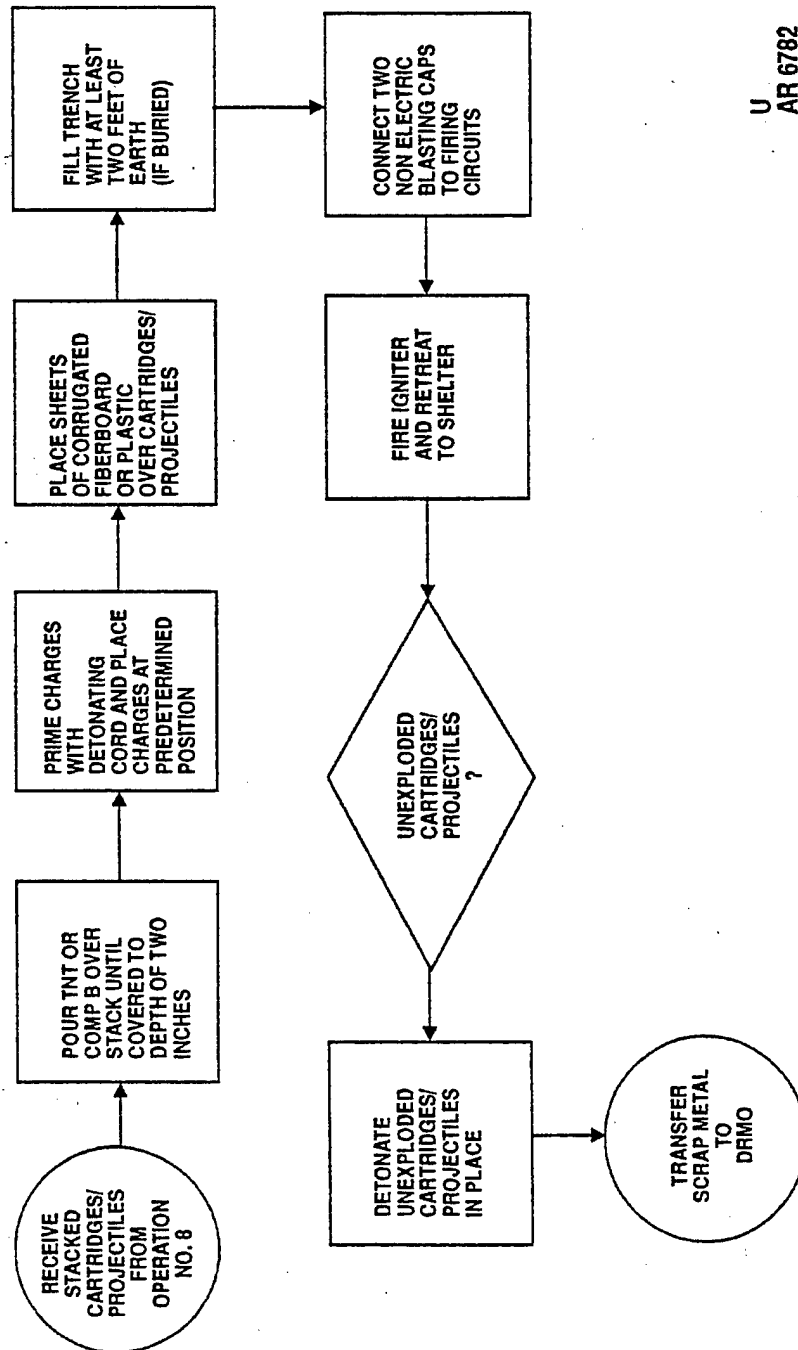
e. Special Facilities Requirements.

None.

f. Flowchart.

Figure 2-9 shows the flowchart for Operation No. 9.

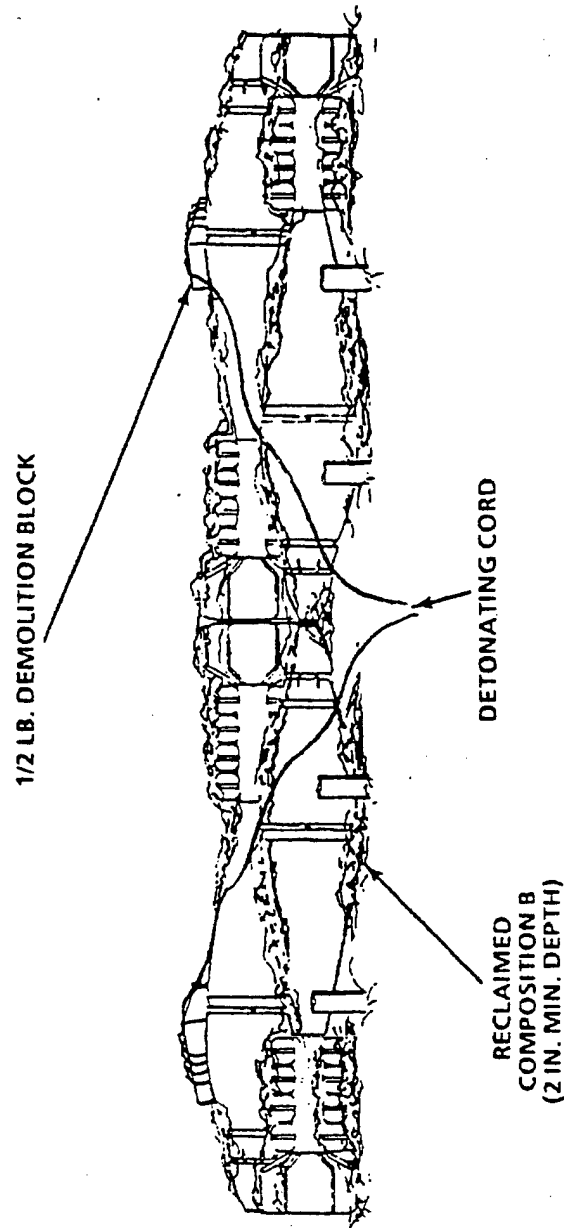
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Figure 2-9. Flowchart for Operation No. 9 - Detonate cartridges/projectiles using nonelectric initiation method.

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Figure 2-9a. Stack of cartridges showing initiating explosive distribution.

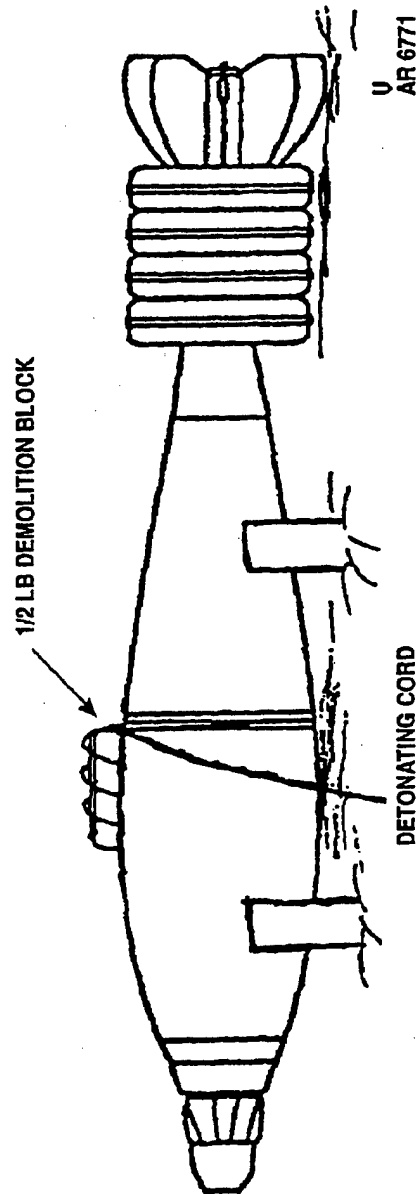


Figure 2-9b. Single round detonation.

2-10. OPERATION NO. 10 - DETONATE CARTRIDGES/PROJECTILES USING ELECTRIC INITIATION METHOD

a. Description of Operation.

WARNING

- ELECTRIC BLASTING CAPS WILL BE CONNECTED TO FIRING CIRCUIT BEFORE TAPING TO DETONATING CORD OR INSERTING INTO DEMOLITION CHARGE.
- DO NOT BURY BLASTING CAPS.

NOTE

The quantity of cartridges or projectiles that may be destroyed at one time is subject to explosive limits of demolition ground.

- (1) Receive stacked cartridges or projectiles from Operation No. 8.
- (2) Open box of flaked or granulated TNT or Composition B and pour it over stack of cartridges or projectiles until stack is covered to depth of two inches minimum per figure 2-9a.
- (3) Prime 1/2-pound TNT blocks with detonating cord as instructed in FM 5-25 or TM 9-1375-213-12 and place on stack of cartridges or projectiles at predetermined points (one block per every ten cartridges or projectiles) per figure 2-9a, leaving sufficient detonating cord running into and out of stack to reach above ground, after burial, to allow easy connection to electric blasting caps.

NOTE

If above-ground detonation is allowed, steps (4) and (5) may be omitted. Range officer is responsible for assuring that all restrictions are observed.

- (4) Tie free ends of firing wire together.
- (5) Place sheets of corrugated fiberboard or plastic over cartridges or projectiles.
- (6) Fill entire trench or pit with earth to ensure complete coverage of cartridges or projectiles with required depth of earth (minimum two feet).
- (7) Test firing circuit as instructed in FM 5-25 or TM 9-1375-213-12.
- (8) Connect two electric blasting caps to firing circuits in accordance with FM 5-25 or TM 9-1375-213-12.
- (9) Warn guard at entrance to area. Ensure that danger area is clear of exposed personnel.
- (10) Fire igniter and retreat to shelter.
- (11) Observe and listen for high-order detonation.

WARNING

CARTRIDGES OR PROJECTILES WITH FUZE EJECTED FROM DETONATION SITE BY DEMOLITION BLAST WILL BE CONSIDERED ARMED AND WILL NOT BE DISTURBED. THEY WILL BE DETONATED IN PLACE.

- (12) After detonation, search area for unexploded cartridges or projectiles.

(13) Detonate any unexploded cartridges or projectiles in place by placing 1/2-pound block of TNT or equivalent beside each cartridge or projectile and detonating remotely (figure 2-9b).

(14) Transfer scrap metal to DRMO.

b. Special Safety Requirements.

(1) Ensure all precautions are taken to comply with AMC-R 385-100, FM 5-25, TM 9-1300-206, TM 9-1300-213-12, and TM 9-1300-277.

(2) Power source end of firing wire will be twisted or shorted and connected to ground, except when actually firing charge or testing circuit.

(3) Safety glasses or industrial goggles must be worn while handling blasting caps.

(4) In case of misfires, personnel will not return to point of detonation for least 30 minutes, after which not more than two qualified personnel will be permitted to examine misfire.

(5) Operators inspecting detonation site will wear flack vest with groin protector, flack helmet, explosive handlers (flame-retardant) coveralls, and safety glasses or industrial goggles.

(6) During detonation operations, the number of people in area exposed to hazard will be kept to minimum. Warning signs or road blocks will be posted to restricted area and to ensure proper segregation of activities. The number of personnel engaged in detonation operations will be no fewer than two, and operations will be arranged so that not all personnel will be exposed to an incident.

(7) All salvaged material will be inspected for and certified free from explosive or harmful contamination prior to transfer to DRMO for sale in accordance with DOD 4160.21-M-1, or for reuse/storage.

(8) Cartridges or projectiles ejected from detonation site by demolition blast will be considered armed and will not be disturbed while placing TNT or M112

demolition charges adjacent to or above cartridges or projectiles.

- (9) Operators handling TNT or other detonating charges will wear explosive handlers (flame-retardant) coveralls.

c. Equipment Requirements.

- (1) Armor, body, fragmentation and small arms protection, ground troops and parachutists, front and back torso.
- (2) Armor, body, fragmentation protection for groin.
- (3) Blasting machine, 10-cap capacity, M32 or M34.
- (4) Coveralls, explosive handlers (flame-retardant) or tyvek.
- (5) Crimper, blasting cap, M2, with fuse cutter.
- (6) Faceshield, industrial.
- (7) Glasses, safety, or
- (8) Goggles, industrial.
- (9) Helmet, ground troops, steel, olive green, quick-release chin strap, or helmet, parachutists, steel, fragmentation protection, universal size.
- (10) Panel, fire control, APE 1055M2.
- (11) Reel, cable, DR-8.
- (12) Reeling machine, cable, hand, RL-39B, with carrying straps, winding device, 7.5-inches long, 13.5-inches wide, 72.5-inches high.
- (13) Test set, blasting cap, M51.

d. Material Requirements.

- (1) Cable, power, electrical, firing, vinyl polymer insulated, two conductors, No. 18AWS, standard, or cable, telephone, electrical.

- (2) Cap, blasting, electric, special, J2 (PETN), type II, or cap, blasting, electric, M6 (T7).
- (3) Charge, demolition, block, Composition C-4, 1-1/4 pound, M112.
- (4) Charge, demolition, block, TNT, 1/2-pound.
- (5) Cord, detonating, reinforced pliofilm wrapped, waterproof, type 2, class L.
- (6) Firing device, demolition, or
- (7) Fuse, blasting, time, M700 (safety fuse).
- (8) Tape, insulation, electrical, black adhesive cotton, 3/4-inch x 85-feet, or tape, pressure-sensitive, adhesive.
- (9) TNT, flake or granulated.

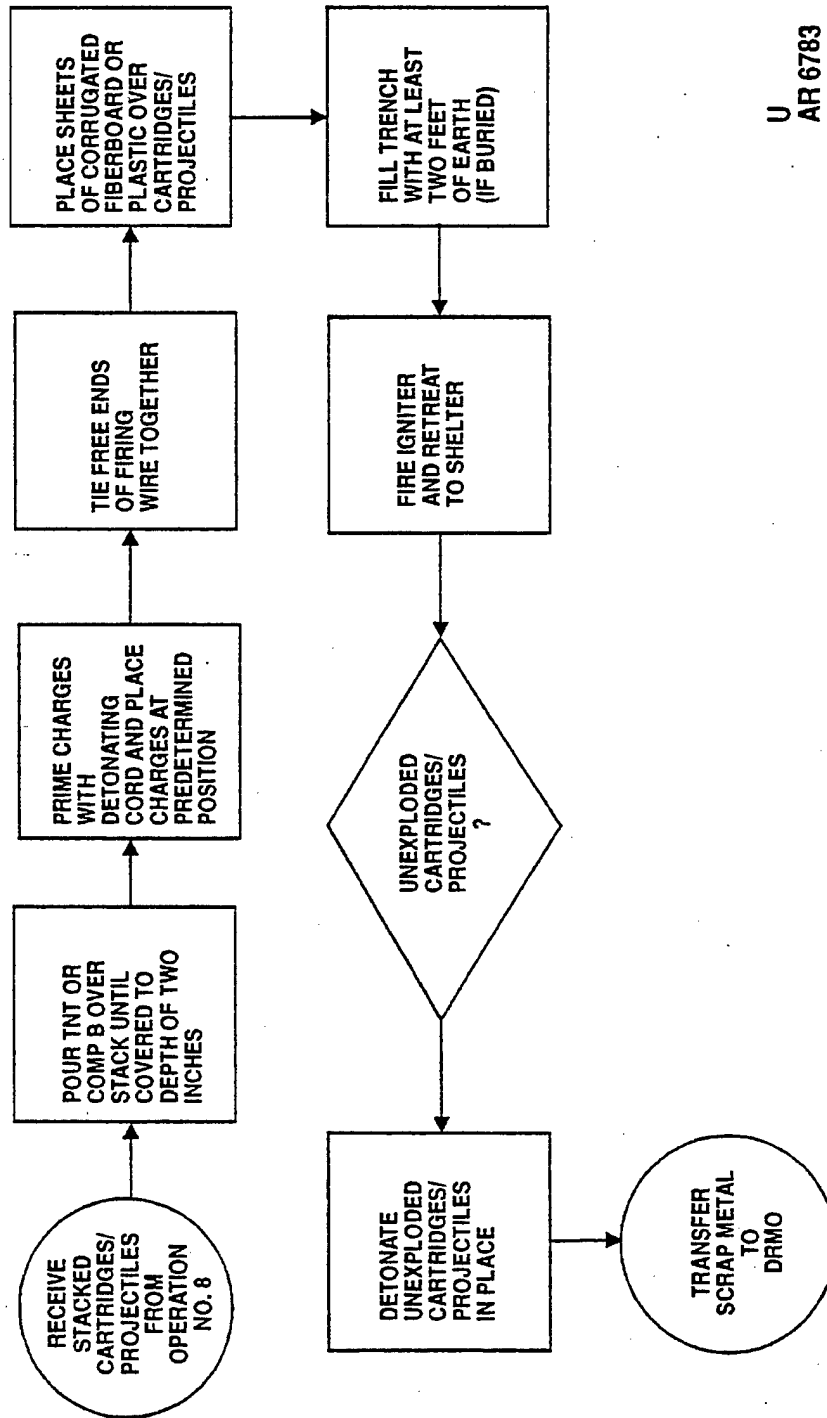
e. Special Facilities Requirements.

None.

f. Flowchart.

Figure 2-10 shows the flowchart for Operation No. 10.

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Figure 2-10. Flowchart for Operation No. 10 - Detonate cartridges/projectiles using electric initiation method.

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2-11. OPERATION NO. 11 - DISPOSE OF SMALL EXPLOSIVE ITEMS

a. Description of Operation.NOTE

Feed rates and furnace setting will be furnished by Toole Army Depot, ATTN: SDSTE-AED. Demilitarization will be in accordance with DMWR 9-1300-0001-D1 and New Resource Conservation Recovery Act (RCRA) Laws.

(1) Receive:

- (a) Primer/ignition cartridge from Operation No. 5.
- (b) Fuze from Operation No. 6.

NOTE

Feed fuzes and primer/ignition cartridges at separate feed intervals to allow furnace to clear before feeding different explosive type.

- (2) Place components in deactivation furnace. Feed munition components, one per conveyor section. DO NOT mix explosive components until all explosive-type fuzes and primer/ignition cartridges are fed into deactivation furnace.

WARNING

DO NOT DIRECTLY OBSERVE DISCHARGE OF
CONVEYOR. USE MIRROR OR REMOTE CAMERA.

- (3) Observe residue from each component as it comes out discharge end of furnace.
- (4) Collect furnace residue and metal parts in 55-gallon drum at discharge conveyor. Flashed metal parts will be segregated as scrap metal.
- (5) Determine if components are decontaminated.

WARNING

SCRAP METALS MUST BE CERTIFIED BY
QUALIFIED PERSONNEL TO BE INERT AND FREE
OF EXPLOSIVES PRIOR TO TRANSFER TO DRMO.

- (6) Transfer residue and scrap metal to DRMO.

b. Special Safety Requirements.

- (1) Operators engaged in deactivation furnace operation will wear leather or leather-palmed gloves, safety glasses or industrial goggles, industrial face-shield, conductive safety shoes, and explosive handlers (flame-retardant) coveralls.
- (2) Small items deactivating furnace will be operated in accordance with Operation Manual APE 1236M1.
- (3) Operators will stand on conductive flooring or conductive mats.
- (4) Do not allow conveyors to stand idle while furnace is heating.

- (5) Clear all personnel from area enclosed by barricaded walls when proper operating temperature is obtained in retort of furnace.

c. Equipment Requirements.

- (1) Coveralls, explosive handlers (flame-retardant).
- (2) Faceshield, industrial.
- (3) Furnace, deactivating, APE 1236M1.
- (4) Glasses, safety, or
- (5) Goggles, industrial.
- (6) Gloves, leather or cloth with leather palms.
- (7) Shoes, safety, conductive.
- (8) System, pollution control, APE 1236M1.
- (9) System, scrap collection, APE 1236M1.

d. Material Requirements.

None.

e. Special Facilities Requirements.

Conductive flooring or conductive mats.

f. Flowchart.

Figure 2-11 shows the flowchart for Operation No. 11.

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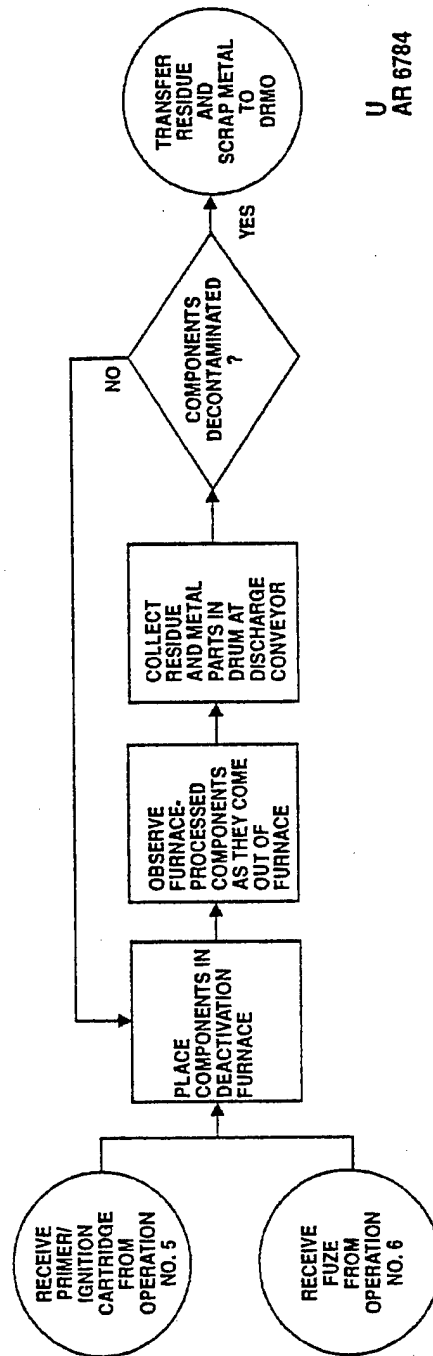


Figure 2-11. Flowchart for Operation No. 11 - Dispose of small explosive items.

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2-12. OPERATION NO. 12 - BURN PROPELLANT INCREMENTS

a. Description of Operation.NOTE

Components will be burned in metal burning trays.

- (1) Receive propellant increments from Operation No. 3 and No. 4.
- (2) Remove water from leaking propellant increments and allow sufficient time for increments to dry.
- (3) Prepare bed (burning tray) deep enough to accommodate quantity of items to be burned at one time. Fill burning tray with enough combustible material (such as scrap lumber, wood, etc.) to ensure hot fire throughout burning tray.
- (4) Place propellant increments on bed. Spread out propellant increments so that layer does not exceed three inches in depth.
- (5) Prepare nonelectric initiating system consisting of section of M700 time blasting fuse and M2 or M60 blasting fuse igniter.
- (6) Insert free end of M700 time blasting fuse into bed of propellant. Ignite fuse and withdraw to safe distance.
- (7) After all burning has ceased (allow minimum waiting period of 30 minutes), thoroughly inspect burning ground for unconsumed components. Collect unconsumed components for decontamination in next burning.

NOTE

- Burning shall not be repeated on tray previously used for burning for at least 24 hours.
- After burning, ashes will be cleaned out of pan and placed in sealed barrels. Samples will be sent to environmental office for testing for hazardous waste. If test shows ashes to be toxic, ashes will be handled as hazardous materials. However, if test shows ashes to be nontoxic, ashes will be handled as nonhazardous material for industrial waste or use as land fill, etc.

--(8) Transfer scrap metal (if any) to DRMO.

b. Special Safety Requirements.

- (1) All burning operations are to comply with applicable provisions of AR 200-1, AR 385-10, AMC-R 385-100, and TM 9-1300-206. Federal, state, and local environmental protection regulations must be adhered to (see appendix G).
- (2) Equipment and handling must comply with applicable safety directives (AMC-R 385-100 and TM 9-1300-206).
- (3) M700 time blasting fuse must be tested for burning rate at beginning of each day's operation and whenever new coil is used. Sufficient length of fuse will be used to allow personnel to retire to safe distance, but under no circumstance should length be less than three feet or have less than 120 seconds burning time.
- (4) Operators will wear explosive handlers (flame-retardant) coveralls and leather or leather-palmed gloves.

c. Equipment Requirements.

- (1) Coveralls, explosive handlers (flame-retardant).
- (2) Gloves, leather or cloth with leather palms.
- (3) Shovel, hand, nonsparking.

d. Material Requirements.

- (1) Fuse, blasting, time, M700, safety fuze.
- (2) Igniter, time blasting fuse, M2 or M60.
- (3) Material, combustible for train (propellant, black powder, oil soaked material, etc.).
- (4) Material, combustible for tray (scrap lumber, wood, excelsoir, etc.).
- (5) Tape, insulation, electrical, black adhesive cotton, 3/4-inch x 85-feet, or tape, pressure sensitive, adhesive.

e. Special Facilities Requirements.

Metal burning trays (if required).

f. Flowchart.

Figure 2-12 shows the flowchart for Operation No. 12.

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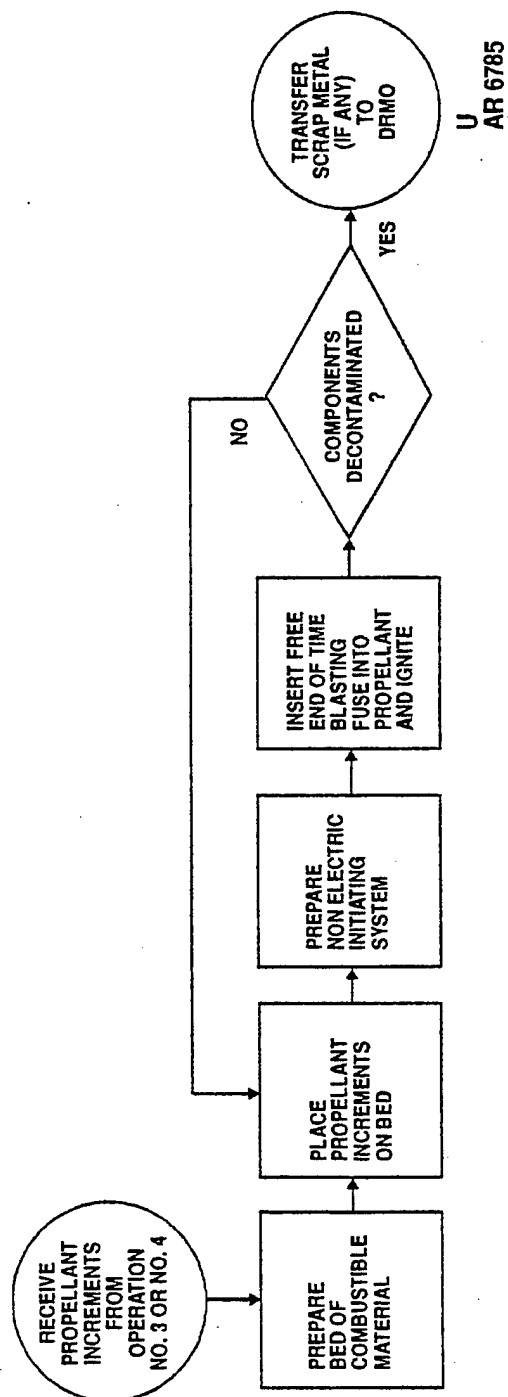


Figure 2-12. Flowchart for Operation No. 12 - Burn propellant increments.

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CHAPTER 3

ACCEPTANCE REQUIREMENTS

3-1. DEMILITARIZATION PROCESS

A complete QA plan must be included in the local SOP based upon the requirements of the work directive. The Quality Assurance Organization (as defined in SB 742-1) will perform a random sampling inspection of generated materiel utilizing MIL-STD-105D, Single Sampling Plan, Normal Severity, Level II, critical--none accepted; AQL 0.65 (Major), to verify the adequacy of the demilitarization and decontamination process.

3-2. RECOVERY OF SALVAGED MATERIEL

a. Materiel to be reclaimed for reuse, returned to stock, or offered for sale will be inspected and accepted or rejected by the Quality Assurance Organization utilizing MIL-STD-105D, Single Sampling Plan, Normal Severity, Level II, critical--none accepted; AQL 0.65 (Major); AQL 1.0 (Minor).

b. Recovered explosives must meet moisture content requirements and must be packaged and marked in accordance with existing regulations.

c. All scrap derived from demilitarization operations will be inspected and certified that it contains no items of a dangerous or hazardous nature in accordance with DOD 4160.21-M-1 by a technically qualified individual of the activity (Ammunition Operations Organization) generating the scrap.

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APPENDIX A REFERENCES

A-1. ADMINISTRATIVE PUBLICATIONS

a. Publication Index. The following publication index should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to the material covered in this manual.

Consolidated Index of Army Publications and

Blank Forms ----- DA PAM 25-30

b. Army Regulations.

Reporting of Transportation Discrepancies in

Shipments ----- AR 55-38

Environmental Protection and Enhancement ----- AR 200-1

Army Safety Program ----- AR 385-10

Accident Reporting and Records ----- AR 385-40

Fire Prevention and Protection ----- AR 420-90

Ammunition Peculiar Equipment (APE) ----- AR 700-20 and
AMC Supp 1

Worldwide Ammunition Reporting System (WARS) -- AR 700-19

Reporting of Item and Packaging Discrepancies ----- AR 735-11-2

c. AMC Regulations.

Industrial, Medical and Hygiene Considerations -----

AMC-R 40-2

Safety Manual ----- AMC-R 385-100

Preparation of Standing Operating Procedures

(SOPs) for Ammunition Operations ----- AMC-R 700-107

Authorizing and Reporting of Demilitarization

of Class V Materiel ----- AMC-R 755-8

Depot Maintenance Program Scheduling, Work-

loading and Reporting System ----- AMC-R 750-28

d. Military Standards.

Sampling Procedures and Tables for Inspection
 by Attributes ----- MIL-STD-105
 Sampling Procedures and Tables for Inspection
 by Variables for Percent Defective ----- MIL-STD-414
 Ammunition Data Cards ----- MIL-STD-1167
 Lot Numbering of Ammunition ----- MIL-STD-1168

A-2. BLANK FORMS

Propellant Acceptance Sheet ----- ARRCOM Form 210-R
 U.S. Army Accident Investigation Report ----- DA Form 285
 Recommended Changes to Publications and Blank
 Forms ----- DA Form 2028
 Ammunition Condition Report ----- DA Form 2415
 Ammunition Transfer Record ----- DA Form 4508
 Fire Incident Report ----- DD Form 2324
 Fire Emergency Report ----- DD Form 2324-1
 Discrepancy in Shipment Report ----- SF 361
 Report of Discrepancy (ROD) ----- SF 364

A-3. EQUIPMENT PUBLICATIONS

a. Technical Manuals.

Ammunition, General ----- TM 9-1300-200
 Ammunition and Explosive Standards ----- TM 9-1300-206
 Military Explosives ----- TM 9-1300-214
 Ammunition Maintenance ----- TM 9-1300-250
 Organizational Maintenance Manual, Artillery
 Ammunition ----- TM 9-1300-251-20
 Direct Support and General Support Maintenance
 Manual for Artillery Ammunition ----- TM 9-1300-251-34
 General Instructions for Demilitarization/
 Disposal of Conventional Munitions ----- TM 9-1300-277
 Operator's and Organizational Maintenance
 Manual - Demolition Materials ----- TM 9-1375-213-12
 Army Ammunition Data Sheets - Artillery
 Ammunition for Guns, Howitzers, Mortars,
 Recoilless Rifles, Grenade Launchers,
 and Artillery Fuzes ----- TM 43-0001-28
 Army Equipment Data Sheets - Ammunition
 Peculiar Equipment ----- TM 43-0001-47

b. Technical Bulletins.

Ammunition: National Stock Numbers and
 Department of Defense Ammunition Codes --- TB 9-1300-256
 Munitions: Suspended or Restricted----- TB 9-1300-385
 Occupational and Environmental Health
 Respiratory Protection Program ----- TB MED 502

A-4. SUPPLY BULLETINS

Ammunition Surveillance Procedures ----- SB 742-1
 Charge, Propelling, Various and Propellant,
 Bulk, Ammunition Surveillance Proce-
 dures ----- SB 742-1300-94-2
 Disposition of Used Ammunition Packing
 Material and Certain Specified Ammuni-
 tion Components ----- SB 755-1

A-5. SPECIAL REQUIREMENTS

ARMS Packaging File Notices, Instructions,
 and Reports to Workers ----- 10 CFR 19
 Occupation Safety and Health Administration,
 Department of Labor ----- 29 CFR 1900-1999
 Regulation Relating to Transportation ----- 49 CFR 100-199
 National Fire Codes ----- Article 91
 Occupational and Environmental Health:
 Hearing Conservation ----- DA Pam 40-501
 The Army Maintenance Management System
 (TAMMS) ----- DA Pam 738-750
 Complete Round Charts Artillery Ammunition ---- AMC-P 700-3-3
 Defense Demilitarization Manual ----- DOD 4160.21-M-1
 Explosives and Demolitions ----- FM 5-250
 DOD Consolidated Ammunition Catalog ----- SB 708-4
 Operational Manual for APE-1236M1, Deactiva-
 tion Furnace and Pentachlorophenol-
 Treated Materials ----- USAEHA TG No. 146
 Code of Federal Regulations ----- Title 49
 Joint Hazard Classification System
 Resource Conservation and Recovery Act
 (PL 89-272, as amended by PL 91-512,
 PL 93-611, and PL 94-580)

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APPENDIX B MATERIALS

National Stock No./ Part No. (w/FSCM)	Nomenclature	Military Specification
6145-00-299-6172	Cable, power, electrical: firing, vinyl polymer insulated, two conductors, No. 18AWS, standard	
6145-01-155-4258	Cable, telephone: electrical	
1375-00-756-1865	Cap, blasting: electric, M6 (T7)	
1375-00-028-5224 or 1375-00-028-5225	Cap, blasting: electric, special, J2 (PETN), type II	
1375-00-756-1864	Cap, blasting: nonelectric, M7 (T7)	
1375-00-028-5226 or 1375-00-028-5228	Cap, blasting: special, non- electric, J1 (PETN), type I	
1375-00-724-7040	Charge, demolition: block, Comp C-4, 1-1/4 lb, M112	
1375-00-028-5140	Charge, demolition: block, TNT, 1/2 lb	
1375-00-028-5168	Cord, detonating: reinforced pliofilm wrapped, waterproof, type 2, class L	
Locally fabricated	Disc, protector, metal aluminum, 1-1/4 in. dia x 1/8-in. thick	
1375-00-028-5189	Firing device, demolition	
1375-00-028-5151	Fuse, blasting, time: M700 (safety fuze)	
1375-00-028-5199	Igniter, time blasting fuse, M2	
1375-00-691-1671	Igniter, time blasting fuse: M60	

National Stock No./ Part No. (w/FSCM)	Nomenclature	Military Specification
------------------------------------------	--------------	---------------------------

Material, combustible for
train (propellant, black
powder, oil soaked material,
etc.)

Material, combustible for
tray (scrap lumber, wood,
excelsoir, etc.)

1315-00-220-5194

Nose plug, projectile:

Locally fabricated

Stakes, wood (batter boards),
1 x 3 x 24 in., pin, pre-
formed

Tape, insulation, electrical,
black adhesive cotton,
3/4 in. x 85 ft

7510-00-266-6714

Tape, pressure sensitive,
adhesive: 1/2 in.

7510-00-266-6712

Tape, pressure sensitive,
adhesive: 1 in.

1376-00-672-0265

Trinitrotoluene: flake

1376-00-134-8982

Trinitrotoluene: granulated

Wire, firing

APPENDIX C

EQUIPMENT AND SPECIAL FACILITIES

C-1. APE EQUIPMENT

	<u>APE NO.</u>
Fixture, removal and insertion, primer	1148
Forklift, gas-operated, for explosive handling	
Furnace, deactivation	1236M1
Machine, automatic lid removal	1270 w/kit E002 or 1270M1 w/kit E002
Machine, two spindle, defuzing	1002, 1002M1 or 1002M2, w/kit E016
Machine, vertical disassembly	1153 or 1153M1, w/kit E029
Panel, fire control	1055M2
Remover, lid, pneumatic	1003 or 1003M1, w/kit E002
Remover, tear strip	1295
System, pollution control	1236M1
System, scrap collection	1236M1
Tester, conductive mat shoe	1953
Vise, pneumatic, ammunition with safety shield	1065 w/kit E013, 1204 w/kit E014 or 1204M1 w/kit E014
Wrench, 81mm mortar fin disassembly	2128M1
Wrench, fuze, pneumatic	1247 w/kit TBD

C-2. OTHER EQUIPMENT

	<u>NSN NO.</u>
Armor, body, fragmentation and small arms protection, ground troops and parachutists, front and back torso	
Armor, body, fragmentation protection for groin	
Blasting machine: M34	1375-00-567-0223
Blasting machine: 10-cap capacity	1375-00-567-0223
Blasting machine: M32	1375-00-567-0223
Container, fuze, approved	
Container, primer/ignition cartridge, approved	
Container, propellant storage, stainless steel lined, approved	
Container, water-filled	
Coveralls, explosive handlers: flame retardant, with head covering	8415-00-279-8720
Coveralls, tyvek	Commercially available
Crimper, blasting cap, M2, with fuse cutter	
Cutter, steel strapping:	5110-00-771-3732
Faceshield, industrial	4240-00-542-2048

NSN NO.

Glasses, safety	
Gloves, men's: cloth with leather palms	8415-00-634-4660
Gloves, cotton	
Gloves, men's and women's: leather	8415-00-634-4658
Goggles, industrial:	4240-00-052-3776
Hammer, sledge	5120-00-293-0887
Helmet, ground troops, steel, olive green, quick-release chin strap	
Helmet, parachutists, steel, fragmentation protection, universal size	
Pliers, diagonal cutting:	5110-00-239-8253
Reel, cable: DR-8	8130-00-407-7859
Reeling machine, cable, hand: RL-39B, with carrying straps, winding device, 7.5-in. long, 13.5-in. wide, 72.5-in. high	3895-00-498-8343
Shoes, safety, conductive	Locally available
Shoes, steel-toed	
Shovel, hand: nonsparking	5120-00-222-4506
Test set, blasting cap: M51	4925-00-999-3454
Wrench, fuze, 1-3/4 open end	
Wrench, fuze adapter	Locally fabricated

C-3. SPECIAL FACILITIES

Conductive flooring or conductive mats
 Deluge system with rapid response detection device
 Metal burning trays

APPENDIX D

TABULATED DATA, MILITARY SPECIFICATIONS AND DRAWINGS

D-1. TABULATED DATA

NOTE

Numerical values, such as weight, dimensions, etc., are nominal values, except when specified as maximum or minimum. Actual items may vary slightly from these values. Allowable limits can be obtained from drawings indicated in paragraph D-3.

Complete round:

Type-----	HE
Weight (as fired)-----	9.42 lb (M821A1)
	9.42 lb (M889A1)
Length-----	19.55 in. (M821A1)
	19.67 in. (M889A1)
Cannon used with-----	M29 Series and M252

Projectile:

Body material-----	Forged steel
Color-----	Olive drab w/yellow marking
Filler and weight-----	Comp B, 2.05 lb

Components:

Ignition cartridge-----	M299
Propellant charge-----	M220
Primer-----	Percussion M35
Fin assembly-----	M24
Fuze-----	MO, M734 (M821A1)
	PD, M935 (M889A1)

Temperature limits:

Storage:

Lower limit -----	-65°F (for period not more than 3 days)
Upper limit -----	+160°F (for period not more than 4 days)

Firing:

Lower limit -----	-50°F
Upper limit -----	+145°F

Packing ----- 1 round per wax-treated fiber container; 3 fiber containers in metal container

Packing box:

Metal container:

Weight ----- 50.1 lb

Dimensions ----- 14.34 x 5.7 x 22.82 in.

Cube ----- 1.1 cu ft

Metal container, PA 156

Weight ----- 41 lb

Dimensions ----- 23-11/16 x 13-3/8 x 5-5/16 in.

Cube ----- 1.7 cu ft

Shipping and storage data:

Quantity-distance class ----- (08) 1.2

Storage compatibility group ----- E

DOT marking ----- CARTRIDGES FOR WEAPON UN0006

DODAC ----- 1315-C878 (M821A1)

1315-C877 (M889A1)

Performance oriented packaging

marking -----



4A1/Y82/S/*

USA/DOD/AYD

* Enter last two digits of year packed

D-2. MILITARY SPECIFICATION

Ammunition, General Specification for ----- MIL-A-002550C

Cartridge, 81mm: HE, M821A1 and M889A1 ----- MIL-C-70996

D-3. DRAWINGS

Body Loading Assembly, 81mm, HE, M821A1 and

M889A1 ----- 12630553-1

Cartridge, 81mm: HE, M821A1 w/Fuze, MO, M734 --- 12630672

Cartridge, 81mm: HE, M889A1 w/Fuze, PD, M935 --- 12630535

Cartridge, Ignition, M299 ----- 9293422

Fiber Container, PA 149 ----- 12630599

Fin Assembly M24 ----- 11726889

Fuze, Multi-Option, M734 (M821A1) ----- 11723100

Fuze, Point-Detonating, M935 (M889A1) ----- 9255258

Marking and Packing for Container, Ammunition,

PA 156 and PA 157, for Cartridge, 81mm ----- 9287601

Marking and Packing for Container, PA 149,

Ammunition Fiber for Cartridge, 81mm, M879,

M821A1 and M889A1 ----- 9287601

Metal Container, PA 156 ----- 12944511

Plug Closing ----- 7549076

Propellant Increment M220 ----- 9280588

Ring, Obturating ----- 11751152

APPENDIX E

APPROVED INTRAPLANT TRANSFER EQUIPMENT

E-1. GENERAL

a. This information is provided to assist the depot in developing an economical, efficient, and safe method of conveying and transporting ammunition and components through the operations cited in this DMWR.

b. The Ammunition Peculiar Equipment (APE) listed in this appendix is approved and preferred for use in ammunition maintenance transfer operations. Use of equivalent, non-APE equipment is acceptable if the listed APE is not available.

c. Operation of approved APE and approved equivalent non-APE must be in accordance with all local safety requirements.

d. Use of APE is governed by AR 700-20.

e. Refer to TM 43-0001-47 and the applicable Operator's Manuals for further information and data concerning the listed ammunition transfer equipment.

f. Contact AMCCOM, Rock Island, IL, APE Section (AMSMC-DSM), DSN 793-6881/5974, with further questions concerning transfer equipment, if required.

E-2. APPROVED LIFTING DEVICES

a. Device, Lifting and Positioning, APE 2146 (Kit EO01 optional). Used to lift and position heavy objects such as artillery projectiles (155mm and above) and bombs. Optional Kit EO01 is used to invert projectiles after lifting. The device, by itself, has a 400-pound lifting capacity; with the EO01 Kit, it has a 230-pound lifting capacity. The device must have access to air at 100 psi.

b. Device, Projectile Lifting, APE 2168. Used to raise or lower 155mm through 8-inch projectiles from a belt conveyor to a monorail conveyor. Used in conjunction with approved conveyors APE 1022M1 and APE 1044M1. The device must have access to air at 80-100 psi.

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APPENDIX F

PENTACHLOROPHENOL (PENTA)-TREATED PACKING MATERIALS

F-1. GENERAL

The degree of hazard associated with Pentachlorophenol (PENTA)-treated packing materials cannot be determined by visual examination. There are no quantifiable criteria to use in judging such terms as "loose" or "excessive." The guidance given herein should be followed under the direction of a resident Industrial Hygienist who has evaluated the actual PENTA exposure in question. PENTA itself is a registered pesticide and is toxic by inhalation, ingestion, or contact. In situations where liquid solutions of PENTA are to be used, the toxic hazards can be significant and professional industrial hygiene/occupational medicine support should be obtained prior to planning such operations.

F-2. PERSONAL HYGIENE REQUIREMENTS

The handling of treated packaging materials represents less hazard, but it is necessary to maintain both procedural controls and good personal hygiene. Persons handling PENTA-treated wooden boxes or pallets will wear leather-palmed gloves and flame-retardant or tyvek coveralls when the items and gloves are dry. Personnel should not be permitted to eat, drink, or smoke during work periods. Personnel should be required to wash prior to eating, drinking, smoking or using toilet facilities, and after each shift. The leather-palmed gloves should be maintained separate from items of personal clothing and should be disposed of as PENTA-contaminated when no longer required. The coveralls should be laundered after use to prevent accumulation of PENTA. Any personnel who may be pregnant should not be allowed to work with PENTA-treated material. Personnel encountering problems relating to PENTA-treated material should refer them to Installation/Unit Medical Officer.

F-3. AREAS OF WETNESS OR TACKINESS

PENTA-treated items that show areas of wetness, tackiness, or crystallization on surfaces represent a higher degree of hazard. When it is necessary to handle such materials, impervious protective gloves and aprons (neoprene or nitrile rubber) should be worn to prevent skin contact and contamination of clothing. The gloves may be men's solvent resistant, black, type III, gloves (NSN 8415-00-823-7455) or equivalent. All protective gear and clothing which directly contacts PENTA crystals, solu-

tion, or PENTA-treated materials showing evidence of wetness or tackiness, should be replaced or laundered after use to prevent accumulation of PENTA. Even when the treated materials do not show evidence of wetness, tackiness or crystallization, it is good practice to have the clothing laundered after use.

F-4. VOLATILIZED PENTA

Under conditions of warm temperatures or enclosed storage, volatilized PENTA may cause respiratory distress and/or eye irritation. An obvious odor of PENTA or irritation of the mucous membranes of the eyes, nose, or throat are indications of potentially harmful airborne PENTA dust, mist, or vapor. Ventilation sufficient to reduce the irritation to an unnoticeable level or chemical cartridge respirators, with organic vapor cartridges and dust, fume or mist filters, including pesticide respirators, will be required. If the airborne PENTA concentration exceeds, or is expected to exceed, the Threshold Limit Value (TLV) of 0.5 mg/m³ Time Weighted Average (TWA), a NIOSH-approved organic vapor respirator with dust prefilter must be worn. The U.S. Army Environmental Hygiene Agency provides the following sampling guidance for monitoring personal exposure to PENTA; however, supporting laboratories should be contacted to verify their particular sampling protocol.

<u>Mechanism</u>	<u>Equipment</u>	<u>Sample Rate or Time</u>	<u>Sample Vol in Liters</u>	
			<u>Min</u>	<u>Max</u>
a. Carried by Sawdust	Filter Cassette closed-face with spacer (CE 0.8 Micron)	1-2 Liters /Minute	50	500
b. Vapor	Midget Impinger (15 ml of Ethylene Glycol)	1.5 Liters /Minute	100	240

If the TLV of 0.5 mg/m³ TWA is exceeded, adequate precautions must be taken to reduce worker exposure to a safe level.

F-5. WORKING PENTA-TREATED WOOD

Personnel should not burn PENTA-treated wood or scraps due to the transmittability of PENTA particles, dust, and vapor into smoke, and they should not be allowed to work PENTA-treated wood (sanding, sawing, drilling, etc.) because of the potential release of PENTA-contaminated particles and dust.

F-6. DISPOSITION OF CONTAMINATED CLOTHING

Clothing, rags or gloves that have been contaminated with PENTA, and are no longer required, should be placed in metal containers and sealed. The containers of waste material should be labeled as to contents and be provided to local property disposal personnel for appropriate disposal. In OCONUS locations, disposal should consider the environmental requirements of the host nation. Specific information on the safe storage and disposal of PENTA-contaminated materials may be obtained from U.S. Army Environmental Hygiene Agency, Toxicology Division (HSHB-07) and the Waste Disposal Engineering Division (HSHB-ES-H), Edgewood, MD, DSN 584-2024.

F-7. CRYSTALLIZATION (BLOOMING) OF PENTA-TREATED MATERIALS

Crystallization (bloom) of PENTA-treated materials may require correction if it poses a health hazard to individuals, as determined by local medical authorities. The process of removing excess crystals should be accomplished without increasing the health risk to exposed personnel. Specific procedures and industrial hygiene support should be requested from U.S. Army Environmental Hygiene Agency, Toxicology Division (HSHB-07) and the Waste Disposal Engineering Division (HSHB-ES-H), Edgewood, MD, DSN 584-2024.

F-8. HANDLING OF LUMBER TREATED WITH ZINC NAPHTHENATE/COPPER NAPHTHENATE

Prevent inhalation, ingestion, and skin contact. Personnel should wash hands before eating, drinking, smoking, and using toilet facilities. All exposed areas of the body should be washed at the end of each workday. Leather-palmed gloves should offer proper skin protection. If skin irritation is noted, a vinyl-coated glove can then be substituted. Coveralls may be required if irritation is noted for other areas of the body. A NIOSH-approved dust mask should be worn when sawing and machining treated wood.

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APPENDIX G

ENVIRONMENTAL REQUIREMENTS

G-1. GENERAL REQUIREMENTS

Consideration must be given to controls when performing operations which affect air, soil, surface water, and ground water. Government installations require permits to perform demilitarization/disposal operations by either open burning or detonation. The responsible environmental office must verify that specific requirements and limitations are met. Limitations and restrictions contained in those documents will be put into an environmental portion of the local Standing Operating Procedure (SOP). The following must be addressed:

a. Ensure that appropriate environmental permits, licenses or exemptions are available at the operating locations.

b. Temperature, cloud coverage, wind direction and velocity, and authorized operating time of day will be obtained and integrated into daily operations.

c. Logs of materials open burned or detonated will be maintained as required by Environmental Regulatory Authority permits, licenses or exemptions.

d. Storage and disposition of wastes will be in compliance with Resource Conservation and Recovery Act and associated Federal and State regulations.

G-2. EMISSION CONTROL

Operations should be planned to eliminate or restrict, to an acceptable minimum, any procedures which would produce residues or emissions hazardous to health or environment. Residues created must be disposed of by a safe and environmentally acceptable means. Fugitive emissions must be dispersed in such a manner that personnel health and the surrounding ecology will not be adversely affected.

G-3. NOISE CONTROL

Demolition site locations and operations will be in accordance with The Army Environmental Noise Abatement Program, AR 200-1, and TB MED 501. Methods and procedures will be taken to mitigate unacceptable noise levels to off-post communities and other noise-sensitive areas. DA considers demolition sites

with a day-night average level of 65 decibels and below as being acceptable for residences and other noise-sensitive areas.

G-4. TECHNICAL ASSISTANCE

Technical assistance with respect to these health and environmental restrictions can be obtained from the U.S. Army Environmental Hygiene Agency, ATTN: HSE-E, Aberdeen Proving Grounds, MD 21010-5001.

G-5. ENVIRONMENTAL DATA

a. Key to Abbreviations.

ACGIH American Conference of Governmental Industrial Hygienists
BEL Biological Exposure Index
C Continuous
CL Ceiling Concentration
DFG MAK German Research Society's Maximum Allowable Concentration Values
ETA Equivocal Tumorigenic Agent
g Grams
H Hours
kg Kilograms
LC50 Lethal Concentration Fifty (a calculated concentration of material in air, exposure to which for a specified length of time is expected to cause the death of 50% of an entire defined experimental animal population)
LCLo Lethal Concentration Low (the lowest concentration of a material in air, other than CL50, which has been reported to have caused death in humans or animals)
LD50 Lethal Dose Fifty (a calculated dose of material which is expected to cause the death of 50% of an entire defined experimental animal population)
LDLo Lowest Published Lethal Dose
M Minutes
m Meters
mg Milligrams
NIOSH REL .. National Institute for Occupational Safety and Health Recommended Exposure
OSHA Occupational Safety and Health Act
PEL Permissible Exposure Level
pph Parts per hundred
ppm Parts per million

REP Reproductive Effects
STEL Short Term Exposure Limit
TCLo Toxic Concentration Low (the lowest concentration of a material in air to which humans or animals have been exposed for any given period of time that has produced any toxic effect in humans or produced a carcinogenic, neoplastigenic, or teratogenic effect in animals or humans)
TDLo Toxic Dose Low (the lowest dose of a material introduced by any route, other than inhalation, over any given period of time that has produced any toxic effect in humans or to produce carcinogenic, neoplastigenic, or teratogenic effect in animals or humans)
TLV Threshold Limit Values
TWA Time Weighted Average

b. Chemical Components.

(1) M935 Point Detonating Fuze, (M889A1 Cartridge only):

- (a) Booster Pellet: 12.7 g Comp A5 (98.5% RDX, 1.5% Stearic Acid)
- (b) Lead Charge: 140 mg RDX, Type A or B, Class C, MIL-A-398

(c) M53 Delay Element Assembly:

1. 35 mg Lead Styphnate/Pyrotechnic Mix (40% Lead Styphnate, 44% Red Lead Oxide, 5% Nitrocellulose/Ethyl Centralite, 11% Silicon)
2. 272 mg Delay Material (52% Barium Chromate, 12.3% Potassium Perchlorate, 26% Zirconium-Nickel Alloy, 9% Rareox No. 14)
3. 72 mg AlA Ignition Powder (65% Zirconium Powder, 25% Ferric Oxide, 10% Diatomaceous Earth)
4. 11 mg Primer Mixture #70 (25% Lead Thiocyanate, 17% Antimony Sulfide, 53% Potassium Chlorate, 5% TNT)

(d) M76 Stab Detonator:

1. 32 mg NOL #130 Primer Mix (40% Lead Styphnate, 15% Antimony Sulfide, 20% Barium Nitrate, 20% Lead Azide, 5% Tetracene)
2. 82 mg Lead Azide, RD 1333, MIL-L-46225
3. 70 mg RDX, Type B, Class C, MIL-R-398
4. 42 mg AlA Igniter Powder (65% Zirconium Powder, 25% Ferric Oxide, 10% Diatomaceous Earth)
5. 25 mg Delay Composition (86% Barium Chromate, 14% Amorphous Barium Powder)

(e) M98 Stab Detonator:

1. 17.5 mg Primer Mix #130 (40% Lead Styphnate, 15% Antimony Sulfide, 20% Barium Nitrate, 20% Lead Azide, 5% Tetracene)
2. 100 mg Lead Azide, RD 1333
3. 75 mg RDX, Type A or B

(f) The M935 fuze body is constructed primarily of aluminum with some internal parts made of zinc.

(2) M734 Multi Option Fuze (M821A1 Cartridge only):

(a) Booster Pellet: 8 g Comp A-5

(b) Lead Charge: 125 mg Comp PBXN-5, Type I, MIL-E-81111

(c) M61 Stab Detonator:

1. 42.5 mg NOL #130 Primer Mix
2. 85 mg Lead Azide, RD 1333, MIL-L-46255
3. 32.5 mg RDX, Type II, Class 3

(d) Delay Primer:

1. 13 mg NOL #130 Primer Mix
2. 15 mg FA 878 Igniter Mixture (20% Barium Nitrate, 20% PETN, 20% Lead Dioxide, 40% Zirconium)
3. 18 mg AlA Ignition Compound, Gasless, MIL-P-22264, Amend 2 (65% Zirconium Powder, 25% Ferric Oxide, 10% Diatomaceous Earth)
4. 60 mg Delay Powder MBK (70% Molybdenum, 18% Barium Chromate, 12% Potassium Perchlorate)
5. 18 mg Lead Azide, RD 1333, MIL-L-46255

(e) Delay Primer (Alternate):

1. 12 mg Priming Input Mixture (40% Lead Styphnate, 15% Antimony Sulfide, 20% Barium Nitrate, 20% Lead Azide, 5% Tetracene)
2. 15 mg Priming Output Mixture (11% Lead Azide, 27% Zirconium, 62% Lead Peroxide, 2.7% Viton)
3. 50 mg Delay Blend (85% Barium Chromate, 15% Boron)
4. 18 mg Lead Azide, RD 1333, MIL-L-46225

(f) The M734 fuze body is constructed primarily of plastic and aluminum.

- (3) Booster, Pellet: 43 g Comp CH-6, MIL-C-21723 (97.5% RDX, 1.5% Calcium Stearate, 0.5% Graphite, 0.5% Polyisobutylene)
- (4) M299 Ignition Cartridge: 115 g M9 Powder Propellant, MIL-P-60398 (57.75% Nitrocellulose, 40% Nitroglycerine, 0.75% Ethyl Centralite, 1.5% Potassium Nitrate)

(5) M35 Primer: 0.37 g No. 70 Primer Mixture (25% Lead Thiocyanate, 17% Antimony Sulfide, 53% Potassium Chlorate, 5% TNT)

(6) M220 Propelling Charge: 535 g

(a) Propelling Charge Container [71% Nitro-cellulose, 1% Diphenylamine, 7% Resine and Additives, Fiber (13.75% Kraft, MIL-C-50269, 3.75% Acrylic, Fibrillated, MIL-F-50533, 6.5% Polyester, Staple Fiber)]

(b) M10 Flake Propellant: 392 g, MIL-S-70547 (84% Nitrocellulose, 9.7% Nitroglycerine, 3% Potassium Sulphate, 2.7% Ethyl Centralite, 0.4% Graphite)

(7) Body Composition: Steel

(8) Fin Composition: Aluminum Alloy 2024-T3511

c. Combustion Products.

The primary products of combustion of propellants used in propelling charges and ignition cartridges are as follows: carbon monoxide (CO), water (H₂O), carbon dioxide (CO₂), nitrogen (N₂), and hydrogen (H₂). Organic explosives with nitro groups (e.g., TNT, Comp B, RDX, etc.) produce the following main products: water (H₂O), nitrogen (N₂), carbon dioxide (CO₂), ammonia (NH₃), carbon (C), and carbon monoxide (CO). Other products that may be expected, depending upon factors such as primer charge, binder or trace elements, are metal oxides (e.g., PbO₂, MgO, BaO), oxides of sulfur (e.g., SO, SO₂, SO₃), and chlorides (e.g., HCl, KCl). These emissions are quantified in the following list:

<u>Gas</u>	<u>Moles/Kg of Compound</u>
CO (carbon monoxide)	1.41915E+01
H ₂ O (water)	7.36670E+00
CO ₂ (carbon dioxide)	7.28762E+00
H ₂ (hydrogen gas)	5.73455E+00
N ₂ (nitrogen gas)	4.72145E+00
KOH (potassium hydroxide)	7.31609E-02
NH ₃ (ammonia)	4.75233E-05
HCN (hydrogen cyanide)	2.57646E-06

CH ₂ O (formaldehyde)	1.73143E-06
CH ₄ (methane)	1.01200E-06
NO (nitrous oxide ion)	1.10620E-07
K (potassium ion)	2.87164E-02
OH (hydroxide ion)	9.50700E-06
KO (potassium ion)	1.59176E-08
H (hydrogen ion)	2.69223E-04
CHO (aldehyde ion)	1.47809E-07

d. Toxicity of Components/Products.

- (1) HMX is classified as poisonous by ingestion and intravenous routes. When heated to decomposition it emits toxic fumes of NO_x.

Toxicity Data:

LD50 - 1500 mg/kg (mouse, oral)
 LDLo - 40 mg/kg (dog, intravenous)
 LD50 - 300 mg/kg (guinea pig, oral)
 LD50 - 28 mg/kg (guinea pin, intravenous)

- (2) RDX was shown to be a corrosive irritant to skin, eye and mucous membranes. It is poisonous by ingestion, intraperitoneal, and intravenous routes. Cases of epileptiform convulsions have been reported from exposure. When heated to decomposition it emits toxic fumes of NO_x.

ACGIH TLV: TWA 1.5 mg/m³ (skin)

Toxicity Data:

LD50 - 100 mg/kg (rat, oral)
 LDLo - 100 mg/kg (cat, oral)
 LDLo - 500 mg/kg (rabbit, oral)

- (3) PETN may cause human systemic effects by ingestion dermatitis. Effects are similar to nitroglycerin, i.e., headache, weakness, and fall in blood pressure. When heated to decomposition it emits highly toxic fumes of NO_x.

Toxicity Data:

TDLo - 1669 mg/kg/8Y-C:SKIN (man, oral)

- (4) TNT is poisonous by subcutaneous route and moderately toxic by ingestion. Human systemic effects by ingestion include hallucinations or distorted perceptions, cyanosis, and gastrointestinal changes. Experimental reproductive effects have been experienced. TNT is also a skin irritant and may be absorbed through the skin. It can cause headaches, weakness, anemia and liver injury. When heated to decomposition it emits highly toxic fumes of NO_x .

OSHA PEL: TWA 1.5 mg/m³ (skin)
 ACGIH TLV: TWA 0.5 mg/m³ (skin)
 DFG MAK: 0.15 ppm (1.5 mg/m³)

Toxicity Data:

LDLo - 28 mg/kg (human, oral)
 LD50 - 795 mg/kg (rat, oral)
 LD50 - 660 mg/kg (mouse, oral)

- (5) Antimony sulfides are poisonous by ingestion, inhalation, and intraperitoneal routes. Locally, antimony compounds irritate the skin and mucous membranes. When heated to decomposition or when in contact with acid or acid fumes, it emits highly toxic fumes of oxides of sulfur and antimony.

OSHA PEL: TWA 0.5 mg(Sb)/m³
 NIOSH REL: TWA 0.5 mg(Sb)/m³

- (6) Barium Chromate is a poison and a human carcinogen.

OSHA PEL: TWA 0.1 mg(C_3O_3)/m³; 0.5 mg(Ba)/m³
 ACGIH TLV: TWA 0.5 mg(Ba)/m³; Human Carcinogen
 NIOSH REL: TWA 0.001 mg(Cr(VI))/m³

- (7) Barium Nitrate is poisonous by ingestion, subcutaneous, parenteral, and intravenous routes. It is an irritant to skin and eyes. When heated to decomposition it emits very toxic fumes of NO_x .

OSHA PEL: TWA 0.5 mg(Ba)/m³
 ACGIH TLV: TWA 0.5 mg(Ba)/m³

Toxicity Data:

LD50 - 355 mg/kg (rat, oral)
 LDLo - 10 mg/kg (mouse, subcutaneous)
 LD50 - 8.8 mg/kg (mouse, intravenous)
 LDLo - 800 mg/kg (dog, oral)
 LDLo - 150 mg/kg (rabbit, oral)
 LDLo - 30 mg/kg (rabbit, parenteral)

- (8) Black Powder is poisonous by intravenous route and moderately toxic by ingestion. Ingestion of large quantities may cause gastroenteritis. Chronic exposure can cause anemia, nephritis, and methemoglobinemia. When heated to decomposition it emits toxic fumes of SO_x , K_2O and NO_x . The following toxicity data is for potassium nitrate, the main component of black powder (other components are charcoal and sulfur):

Toxicity Data:

LD50 - 3750 mg/kg (rat, oral)
 LD50 - 1901 mg/kg (rabbit, oral)

- (9) Boron is poisonous by ingestion.

Toxicity Data:

LD50 - 2000 mg/kg (mouse, oral)
 LD50 - 300 mg/kg (mammal, oral)

- (10) Diatomaceous Earth dust may cause fibrosis of the lungs. Roasting or calcining at high temperatures produces cristobalite and tridymite, thus increasing the fibrogenicity of the material.

OSHA PEL: 80 mg/m³/SiO₂

ACGIH TLV: TWA 10 mg/m³ (dust)

- (11) Diethylphthalate is poisonous by intravenous route. It is moderately toxic by ingestion, subcutaneous, and intraperitoneal routes. Human systemic effects by inhalation include lachrimation, respiratory obstruction, and other unspecified respiratory system effects. It is an eye irritant and systemic irritant by inhalation. It is an experimental teratogen with other experimental reproductive

effects. It may be narcotic in high concentrations. When heated to decomposition it emits acrid smoke and irritating fumes.

ACGIH TLV: TWA 5 mg/m³

Toxicity Data:

112 mg (rabbit, eye)
TDLo - 53480 mg/kg (rat, oral)
TDLo - 506 mg/kg (rat, intraperitoneal)
TCLo - 1000 mg/m³ (human, inhalation)
LD50 - 6172 mg/kg (mouse, oral)
LD50 - 2749 mg/kg (mouse, intraperitoneal)
LDLo - 1000 mg/kg (rabbit, oral)
LDLo - 100 mg/kg (rabbit, intravenous)
LD50 - 8600 mg/kg (guinea pig, oral)
LDLo - 3000 mg/kg (guinea pig, subcutaneous)

- (12) Ethyl Centralite (Diethyldiphenylurea) is poisonous by intraperitoneal route. When heated to decomposition it burns and emits very toxic fumes of NO_x.

Toxicity Data:

LD50 - 200 mg/kg (mouse, intraperitoneal)

- (13) Ferric Oxide is poisonous by subcutaneous route. It is also a suspected human carcinogen and an experimental tumorigen.

ACGIH TLV: TWA 5 mg(Fe)/m³ (vapor, dust)

Toxicity Data:

TDLo - 135 mg/kg (rat, subcutaneous)
LD50 - 5500 mg/kg (rat, intraperitoneal)

- (14) Hexafluoropropylene is mildly toxic by inhalation. When heated to decomposition it emits toxic fumes of F⁻.

Toxicity Data:

LC50 - 11200 mg/m³/4H (rat, inhalation)
LC50 - 750 ppm/4H (mouse, inhalation)

- (15) Lead Azide is classified as a deadly poison. When heated to decomposition it emits highly toxic fumes of Pb and NO_x.

OSHA PEL: TWA 0.05 mg(Pb)/m³
ACGIH TLV: TWA 0.15 mg(Pb)/m³
NIOSH REL: 0.1 mg(Pb)/m³

- (16) Lead Dioxide (Lead Peroxide) is poisonous by intraperitoneal route. It is probably a severe eye, skin, and mucous membrane irritant. When heated to decomposition it emits toxic fumes of Pb.

OSHA PEL: TWA 0.05 mg(Pb)/m³
ACGIH TLV: TWA 0.15 mg(Pb)/m³
NIOSH REL: (Inorganic Lead) TWA 0.1 mg(Pb)/m³

Toxicity Data:

LD50 - 220 mg/kg (guinea pig, intraperitoneal)

- (17) Lead Styphnate is classified as a poisonous material. Upon decomposition it emits very toxic fumes of NO_x and Pb.

NIOSH REL: (Inorganic Lead) TWA 0.1 mg(Pb)/m³

- (18) Molybdenum is poisonous by intraperitoneal and intratracheal routes. When heated to decomposition it emits toxic fumes of Mo.

OSHA PEL: TWA 15 mg(Mo)/m³
DFG MAK: (Insoluble Compounds) 15 mg/m³;
(Soluble Compounds) 5 mg/m³

Toxicity Data:

TDLo - 5.8 mg/kg (rat, oral)
TDLo - 448 mg/kg (mouse, oral)
LDLo - 114 mg/kg (rat, intraperitoneal)
LDLo - 70 mg/kg (rabbit, intratracheal)

- (19) Nitroglycerine is a human poison by an unspecified route. It has also been found to be poisonous experimentally by ingestion, intraperitoneal, subcutaneous, and intravenous routes. Nitroglycerine is a skin irritant. It can cause respiratory difficulties and death due to respiratory paralysis by

ingestion. The acute symptoms of nitroglycerine poisoning are headaches, nausea, vomiting, abdominal cramps, convulsions, methemoglobinemia, circulatory collapse and reduced blood pressure, excitement, vertigo, fainting, respiratory rales, and cyanosis. Toxic effects may occur by ingestion, inhalation of dust, or absorption through intact skin. When heated to decomposition it emits toxic fumes of NO_x .

OSHA PEL: TWA CL 0.2 ppm (skin)
 ACGIH TLV: TWA 0.05 ppm (skin)
 DFG MAK: 0.05 ppm (0.5 mg/m³)
 NIOSH REL: CL (Nitroglycerine or EGDN) 0.1
 mg/m³/20M

Toxicity Data:

TDLo - 2400 mg/kg (rat, skin)
 TDLo - 220 mg/kg (rat, intraperitoneal)
 TDLo - 36500 mg/kg (rat, oral)
 LDLo - 28 mg/kg (human, unreported)
 LD50 - 105 mg/kg (rat, oral)
 LD50 - 102 mg/kg (rat, intraperitoneal)
 LD50 - 94 mg/kg (rat, subcutaneous)
 LD50 - 23.2 mg/kg (rat, intravenous)
 LD50 - 115 mg/kg (mouse, oral)
 LD50 - 104 mg/kg (mouse, intraperitoneal)
 LD50 - 110 mg/kg (mouse, subcutaneous)
 LD50 - 10.6 mg/kg (mouse, intravenous)
 LD50 - 19 mg/kg (dog, intravenous)
 LDLo - 150 mg/kg (cat, subcutaneous)
 LDLo - 400 mg/kg (rabbit, subcutaneous)
 LD50 - 45 mg/kg (rabbit, intravenous)

- (20) Potassium Perchlorate is a severe irritant to skin, eyes, and mucous membranes. Absorption can cause methemoglobinemia and kidney injury. It has been implicated in a plastic anemia and has had experimental reproductive effects. When heated to decomposition it emits very toxic fumes of K_2O and Cl^- .

Toxicity Data:

TDLo - 2100 mg/kg (rabbit, oral) reproductive

- (21) Potassium Sulfate is moderately toxic to humans by ingestion. It is also moderately toxic experimentally by subcutaneous route. Swallowing large doses causes severe gastrointestinal tract effects. When heated to decomposition it emits toxic fumes of K_2O and SO_x .

Toxicity Data:

LDLo - 800 mg/kg (woman, oral)
 LD50 - 6600 mg/kg (rat, oral)
 LDLo - 3000 mg/kg (guinea pig, subcutaneous)

- (22) Stearic Acid is poisonous by intravenous route. It is a human and experimental skin irritant. When heated to decomposition it emits acrid smoke and irritating fumes.

Toxicity Data:

TDLo - 400 mg/kg (mouse, implant)
 LD50 - 21.5 mg/kg (rat, intravenous)
 LD50 - 23 mg/kg (mouse, intravenous)

- (23) Tetracene is a carcinogen. When heated to decomposition it emits highly toxic fumes of NO_x .

- (24) Vinylidene Fluoride is mildly toxic by inhalation. It is also an experimental neoplastigen and may be an experimental carcinogen. When heated to decomposition it emits toxic fumes of F^- .

Toxicity Data:

TDLo - 1930 mg/kg/52W-I (rat, oral)
 LCLo - 128000 ppm/4H (rat, inhalation)

- (25) Viton (Benzene Hexachloride) is a human systemic poison by ingestion. Human systemic effects by ingestion include convulsions, dyspnea, and cyanosis. It is also poisonous by ingestion, skin contact, intraperitoneal, intravenous, and intramuscular routes. When heated to decomposition it emits toxic fumes of Cl^- , HCl , and phosgene.

OSHA PEL: TWA 0.5 mg/m³ (skin)
 ACGIH TLV: TWA 0.5 mg/m³ (skin)

Toxicity Data:

TDLo - 200 mg/kg (rat, oral)
 TDLo - 2730 mg/kg (mouse, oral)
 TDLo - 260 mg/kg (rabbit, oral)
 TDLo - 25 mg/kg (mouse, oral)
 LDLo - 180 mg/kg (child, oral)
 TDLo - 111 mg/kg (child, oral)
 LD50 - 76 mg/kg (rat, oral)
 LD50 - 500 mg/kg (rat, skin)
 LDLo - 35 mg/kg (rat, intraperitoneal)
 LD50 - 86 mg/kg (mouse, oral)
 LD50 - 125 mg/kg (mouse, intraperitoneal)
 LD50 - 40 mg/kg (dog, oral)
 LDLo - 8 mg/kg (dog, intravenous)
 LD50 - 60 mg/kg (rabbit, oral)
 LD50 - 50 mg/kg (rabbit, skin)
 LDLo - 4.5 mg/kg (rabbit, intravenous)
 LD50 - 127 mg/kg (guinea pig, oral)
 LD50 - 360 mg/kg (hamster, oral)
 LD50 - 640 mg/kg (hamster, intraperitoneal)
 LDLo - 100 mg/kg (wild bird, oral)
 LDLo - 26 mg/kg (wild bird, intramuscular)

- (26) Zirconium is not an industrial poison; however, poisoning may occur due to excessive exposure to zirconium salts. Most zirconium compounds are insoluble and considered inert.

OSHA PEL: TWA 5 mg/m³
 ACGIH TLV: TWA 5 mg/m³; STEL 10 mg/m³
 DFG MAK: 5 mg/m³

- (27) The major portion of products from energetic materials are gases which are dispersed in the atmosphere and readily dissipated.

e. Classification of Hazardous Waste/Materials.

(1) Viton is on the Environmental Protection Agency (EPA) Extremely Hazardous Substances List. Antimony and its compounds, Barium and its compounds, Lead and its compounds, Nitroglycerine, and Viton are on the Community Right To Know List.

(2) HMX, RDX, PETN, TNT, Antimony Sulfide, Barium Chromate, Barium Nitrate, Boron, Diethylphthalate, Ethyl

Centralite, Ferric Oxide, Hexafluoropropylene, Lead Azide, Lead Dioxide, Lead Styphnate, Molybdenum, Nitrocellulose, Nitroglycerine, Potassium Nitrate (the main component of Black Powder), Potassium Perchlorate, Potassium Sulfate, Stearic Acid, Tetracene, Vinylidene Fluoride, Viton, and Zirconium are reported in the EPA Toxic Substance Control Act (TSCA) Inventory.

(3) TNT and Stearic Acid are also reported in the EPA Genetic Toxicology Program. Barium Chromate, Ferric Oxide, Vinylidene Fluoride and Viton are reported in the U.N. International Agency for Research on Cancer (IARC) Cancer Review.

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APPENDIX H

PRELIMINARY HAZARD ANALYSIS

H-1. GENERAL

Preliminary Hazard Analysis (PHA) contained in this appendix identifies potential hazards and the countermeasures to mitigate these hazards. The PHA is for use by installation personnel in the development of the local hazard analysis, tailored to a specific site.

H-2. PROBABILITY/SEVERITY

Tables H-1 and H-2 define the alpha-numeric values shown in the PHA. The values are for probability and severity after the indicated countermeasures are taken. These ratings represent the best judgment of the DMWR engineers, generally not based on special tests. Since damage to equipment or facilities may vary between installations (site specific), severity assessment ratings are for personnel only.

Table H-1. Hazard Severity

Description	Category	Mishap Definition
Catastrophic	I	Death.
Critical	II	Severe injury or severe occupational illness.
Marginal	III	Minor injury or minor occupational injury.
Negligible	IV	Less than minor injury or occupational illness.

Table H-2. Hazard Probability

Description	Level	Frequency Definition
Frequent	A	Likely to occur frequently.
Probable	B	Will occur several times in the life of an item or project.
Occasional	C	Likely to occur sometime during the life of an item or project.
Remote	D	Unlikely but possible to occur during the life of an item or project.
Improbable	E	So unlikely it can be assumed occurrence may not be experienced during the life of an item or project.

H-3. PRELIMINARY HAZARD ANALYSIS

Table H-3, the complete PHA, identifies the hazards for each operation, the countermeasures to mitigate the hazards, and the probability of occurrence and severity to personnel if all countermeasures are taken.

Table H-3. Evaluation of Identified Hazards

OPERATION	POTENTIAL HAZARDS/ RESULTS	COUNTERMEASURES	PROBA- BILITY	SEVERITY
NO. 1 UNLOAD PALLET (SKID)	SHARP EDGES OF STEEL BANDING CAN CUT PERSONNEL. UPON CUTTING, BANDING CAN RECOIL AROUND PERSONNEL CAUSING A CUT OR EYE DAMAGE.	WEAR LEATHER OR LEATHER-PALMED GLOVES, INDUSTRIAL FACESHIELD, AND SAFETY GLASSES OR INDUSTRIAL GOGGLES.	D	III
	PENTA-TREATED PALLET IS TOXIC ON CONTACT.	WEAR LEATHER OR LEATHER-PALMED GLOVES AND EXPLOSIVE HANDLERS OR TYVEK COVERALLS.	E	IV
NO. 2 UNPACK WIREBOUND BOX OR METAL CONTAINER	SHARP EDGES ON BOX CAN RESULT IN CUTS.	WEAR LEATHER OR LEATHER-PALMED GLOVES.	C	IV
	BROKEN OR DAMAGED BOX OR CONTAINER CAN CAUSE FIBER CONTAINER TO FALL ON FEET OF PERSONNEL.	WEAR SAFETY OR STEEL- TOED SHOES, AND REMOVE BOXES OR CONTAINERS FROM TOP DOWN.	D	III
	STEEL STRAPPING CAN RESULT IN CUTS OR EYE DAMAGE.	WEAR LEATHER OR LEATHER-PALMED GLOVES, INDUSTRIAL FACESHIELD, AND SAFETY GLASSES OR INDUSTRIAL GOGGLES.	D	III
	CUTTING TOOLS CAN RESULT IN CUTS OR ABRASIONS.	WEAR LEATHER OR LEATHER-PALMED GLOVES.	D	III
NO. 3 REMOVE CARTRIDGE FROM WAX- TREATED FIBER CONTAINER	CUTTING TOOLS CAN RESULT IN CUTS OR FINGERS CAN GET CAUGHT IN MACHINE.	WEAR LEATHER OR LEATHER-PALMED GLOVES. KEEP GUARDS ON MACHINE.	D	III
	POSSIBILITY OF EXPOSED PROPELLANT DURING OPERATION IS A FIRE HAZARD.	LIMIT NUMBER OF PEOPLE IN BAY. USE CONDUCTIVE FLOORING OR MATS, AND WEAR EXPLOSIVE HANDLERS COVERALLS, CONDUCTIVE SAFETY SHOES, AND SAFETY GLASSES OR INDUSTRIAL GOGGLES. COLLECT LOOSE OR LEAKING PROPELLANT IN WATER-FILLED CONTAINER.	D	III
	PRIMER CAN BE INITIATED DURING HANDLING AND TRANSFER.	PROTECT PRIMER WITH SUITABLE COVERING DURING HANDLING AND TRANSFER OPERATIONS.	D	II

Table H-8. Evaluation of Identified Hazards

OPERATION	POTENTIAL HAZARDS/ RESULTS	COUNTERMEASURES	PROBA- BILITY	SEVERITY
NO. 4 REMOVE PROPELLANT INCREMENTS	PRIMER UNPROTECTED SO ROUNDS DROPPED OR HITTING SHARP OBJECT CAN RESULT IN INJURY TO PERSONNEL.	PROTECT PRIMER WITH METAL DISC OR OTHER SUITABLE COVER.	D	II
	POSSIBILITY OF EXPOSED PROPELLANT DURING OPERATION IS A FIRE HAZARD.	LIMIT NUMBER OF PEOPLE IN BAY. USE CONDUCTIVE FLOORING OR MATS, AND WEAR EXPLOSIVE HANDLERS COVERALLS, CONDUCTIVE SAFETY SHOES, AND SAFETY GLASSES OR INDUSTRIAL GOGGLES. COLLECT LOOSE OR LEAKING PROPELLANT IN WATER-FILLED CONTAINER.	D	III
NO. 5 REMOVE PRIMER/ IGNITION CARTRIDGE	IF CARTRIDGE IS DROPPED, ROUND MAY GO OFF AND CAUSE INJURY TO PERSONNEL.	PROTECT PRIMER WITH METAL DISC OR OTHER SUITABLE COVER.	D	II
NO. 6 DEFUZE CARTRIDGE	FUZE CAN BE INITIATED DURING HANDLING AND REMOVAL.	WEAR EXPLOSIVE HANDLERS COVERALLS AND USE SAFETY SHIELD.	E	II
NO. 7 REMOVE FIN ASSEMBLY	IF CARTRIDGE IS NOT SECURED IN VISE, DAMAGE TO CARTRIDGE AND INJURY TO PERSONNEL MAY RESULT.	RECHECK CARTRIDGE SECURITY IN VISE.	D	III
NO. 8 STACK CAR- TRIDGES/ PROJEC- TILES	DROPPED CARTRIDGE OR PROJECTILE CAN RESULT IN FOOT OR HAND INJURY.	USE TOOLS TO HELP LIFT AND PLACE CARTRIDGES. WEAR SAFETY OR STEEL-TOED SHOES.	C	III
NO. 9 DETONATE CTGS/PRO- JECTILES USING NON- ELECTRIC INITIATION METHOD	TOO MUCH EXPLOSIVE FOR ONE BLAST IS A DANGER TO PERSONNEL.	OBSERVE EXPLOSIVE LIMITS AT DEMOLITION GROUND.	D	II
	CARTRIDGES EJECTED FROM BLASTING SITE MAY BE ARMED AND HANDLING CAN RESULT IN INJURY OR DEATH TO PERSONNEL.	CARTRIDGES EJECTED FROM SITE WILL BE DETONATED IN PLACE REMOTELY.	E	I
	FRAGMENTS CAN CAUSE INJURY TO EYES.	SAFETY GLASSES OR INDUSTRIAL GOGGLES SHOULD BE WORN AT ALL TIMES WHEN DEALING WITH EXPLOSIVES.	D	II
	PERSONNEL CAN SUSTAIN BURNS TO PARTS OF BODY.	OPERATORS WILL WEAR EXPLOSIVE HANDLERS COVERALLS.	D	II

Table H-3. Evaluation of Identified Hazards

OPERATION	POTENTIAL HAZARDS/ RESULTS	COUNTERMEASURES	PROBA- BILITY	SEVERITY
NO. 10 DETONATE CTGS/PRO- JECTILES USING ELECTRIC INITIATION METHOD	TOO MUCH EXPLOSIVE FOR ONE BLAST IS A DANGER TO PERSONNEL.	OBSERVE EXPLOSIVE LIMITS AT DEMOLITION SITE.	D	II
	EXPLOSION OF CARTRIDGE CAN CAUSE PERSONNEL INJURY OR DEATH.	ELECTRIC BLASTING CAPS MUST BE CONNECTED TO FIRING CIRCUIT BEFORE TAPING TO DETONATING CORD OR INSERTING INTO DEMOLITION CHARGE.	E	I
	CARTRIDGES EJECTED FROM BLASTING SITE MAY BE ARMED AND HANDLING CAN RESULT IN INJURY OR DEATH TO PERSONNEL.	CARTRIDGES EJECTED FROM SITE WILL BE DETONATED IN PLACE REMOTELY.	E	I
	FRAGMENTS CAN CAUSE INJURY TO EYES.	SAFETY GLASSES OR INDUSTRIAL GOGGLES SHOULD BE WORN AT ALL TIMES WHEN DEALING WITH EXPLOSIVES.	D	II
	PERSONNEL CAN SUSTAIN BURNS TO PARTS OF BODY.	OPERATORS WILL WEAR EXPLOSIVE HANDLERS OR TYVEK COVERALLS.	D	II
NO. 11 DISPOSE OF SMALL EXPLOSIVE ITEMS	IMPROPER PROCEDURES CAN RESULT IN SEVERE BURNS TO PERSONNEL.	FOLLOW SAFETY PRECAUTIONS AS OUTLINED IN AMC-R 385-100 AND TM 9- 1300-206.	D	II
	EXPLOSIVE MATERIAL MAY BE LEFT IN WITH SCRAP METAL, CAUSING INJURY TO PERSONNEL.	SCRAP METAL MUST BE CERTIFIED FREE OF ALL EXPLOSIVE MATERIAL.	D	II
	EXPLOSIVES MAY DETONATE, CAUSING INJURY TO PERSONNEL.	MAINTAIN BARRIERS AND SAFE SEPARATION DISTANCES.	D	II
NO. 12 BURN PROPELLANT INCREMENTS	EXPLOSIVE MATERIAL MAY BE LEFT IN WITH SCRAP METAL, CAUSING INJURY TO PERSONNEL.	SCRAP METAL MUST BE CERTIFIED FREE OF ALL EXPLOSIVE MATERIAL.	D	II
	IMPROPER PROCEDURES CAN RESULT IN SEVERE BURNS TO PERSONNEL.	FOLLOW SAFETY PRECAUTIONS AS OUTLINED IN AMC-R 385-100 AND TM 9- 1300-206.	D	II
	EXPLOSIVE SCRAP CAN BE BLOWN OUT OF BURNING TRAY.	MAKE SURE THAT EXPLOSIVES ARE BURNING IN SAME DIRECTION AS THE WIND.	D	IV

Table H-3. Evaluation of Identified Hazards

OPERATION	POTENTIAL HAZARDS/ RESULTS	COUNTERMEASURES	PROBA- BILITY	SEVERITY
NO. 12 (CONT)	EXPLOSIVES MAY DETONATE, CAUSING INJURY TO EXPOSED PERSONNEL.	MAINTAIN BARRIERS AND SAFE SEPARATION DISTANCES.	D	III

H-4. RISK ASSESSMENT CODE (RAC) MATRIX

Table H-4 provides a Risk Assessment Code (RAC) matrix which is an evaluation of the degree of risk. A RAC value of 3 or less is unacceptable; indicating that a change in the DMWR procedure is required. A RAC value of 4 or 5 indicates acceptable risk.

Table H-4. Risk Assessment Code Matrix

Hazard Severity	Accident Probability				
	A	B	C	D	E
I	1	1	2	3	5
II	1	2	3	4	5
III	2	3	4	5	5
IV	3	4	5	5	5

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